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LEVEL II

MANAGEMENT INFORMATION SYSTEM
FOR ESD PROGRAM OFFICES

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F. Coker
L. Johnson
D. Smith
Logicon, Inc.
18 Hartwell Avenue
Lexington, MA 02173

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DEPUTY FOR TECHNICAL OPERATIONS
ELECTRONIC SYSTEMS DIVISION
HANSCOM AIR FORCE BASE, MA 01731

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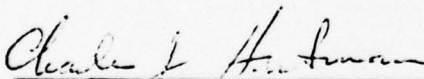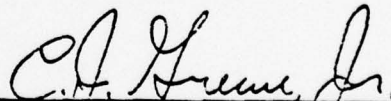## OTHER NOTICES

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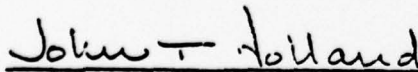
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CHARLES J. HARTMAN
Project Engineer

CHARLES J. GREWE, JR., Lt Col, USAF
Chief, Technology Applications Division

JOHN T. HOLLAND, Lt Col, USAF
Chief, Standards & Evaluation Division

FOR THE COMMANDER

STANLEY P. DEREŚKA, Colonel, USAF
Director, Computer Systems Engineering
Deputy for Technical Operations

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This final report is the result of an initial study effort to identify the management information needs and to define the requirements for an integrated information system within the AF Electronic Systems Division (ESD) acquisition environment. The Management Information System (MIS) functional requirements for the ESD Program Office are defined in terms of the Computer-Aided Design and Specification Tool. The development of the computer data base and a description of the MIS structure is included in the report. This report addresses management areas such as cost/budgeting, scheduling, tracking capabilities, and ECP control.

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PREFACE

This report documents the results of the first phase of a
three-phase study to identify the System Program Office (SPO)
management information needs and to define the requirements
for an integrated information system within the ESD system
acquisition environment. The second and third phases of this
project were not accomplished due to the lack of funds.

Phase 1 was to determine the management information system
(MIS) requirements necessary to support SPO needs. Phase 2
was to evaluate government-owned MISs relating to satisfying
those requirements identified in Phase 1 and to determine if
the data input requirement for the MIS can be satisfied from
a previously developed Computer-Aided Design and Specifi-
cation Tool (CADSAT) data base. Phase 2 also was to
recommend whether or not automated linkage is possible
between the MIS and CADSAT. Phase 3 was to make
recommendations for the implementation of the MIS under
several suboptions.

Since this report is based upon only the tasks accomplished
during Phase 1, the contents must be evaluated as tentative
results. The pursuit of the perceived needs of management
personnel documented in this report may or may not yield

tangible benefits.   Further work is necessary in this area

and should concentrate upon the purpose of existing

management information systems and their application to SPO

needs, with an emphasis on new management techniques.

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SECTION 1

INTRODUCTION

1.0 Overview

This section presents the purpose, scope and
background associated with this report.

1.1 Purpose

The purpose of this project has been to evaluate
ESD program office management-information-system (MIS) (1)
capabilities and needs and to define the requirements for an
integrated information system for ESD program offices.

1.2 Scope

This project has resulted in establishing
requirements for an integrated ESD program office MIS which
can provide the program director with information concerning
project budget and expenditures, schedules, and tracking

(1) NOTE: Three abbreviations are used in this report for
the program office management-information-system. These are
MIS, mis, and mainsy.

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capabilities. The requirements definition of this integrated MIS was developed using a computer-aided analysis technique, and the reports describing this integrated MIS are presented as part of this report (Appendices 40 through 80).

1.3 Project Background

ESD/TOI has been developing a set of automated tools for assisting ESD program office system acquisitions. In addition, ESD staff offices and program offices have developed special purpose data base systems to support their particular system acquisition efforts. The task undertaken in this study was to evaluate the technical nature of the data base management systems employed at ESD and to determine the functional requirements for an integrated MIS which could be used by a majority of ESD program offices for meeting their management and reporting needs.

One point should be remembered when reviewing the requirements definition of the MIS presented in this study. This report summarizes the MIS capabilities envisioned by the ESD staff and program office personnel interviewed. The data base developed represents the definition of requirements that the interviews revealed. Although additional phases associated with this study were planned, they were not

accomplished because of the loss of ESD/TOI project funds
allocated to this study. In particular, the MIS design
activities would have been accomplished in the later phases
of the project.   Therefore, the MIS requirements identified
herein need additional review before any design and
implementation can proceed. In essence, the MIS represented
in this technical report is an "ideal" concept as envisioned
by the ESD personnel interviewed and as evaluated by the
study personnel.

SECTION 2

TECHNICAL APPROACH

2.0 Introduction.

This section describes the technical approach
(Figure 2-1) used to determine the management information
needs envisioned by several program offices at ESD.

The objective of the effort has been to identify
automated MIS requirements which can enable program offices
to maintain better cost and schedule control. "Requirements"
as used in this report are those specific capabilities to be
included in a system. These requirements can be measured and
readily tested. The requirements defined at this stage are
"ideal"; additional effort is necessary to reduce the
requirements to those which can be realistically implemented.
An MIS is used in this report to mean any manual, semi-
manual, or automated information processing activities in
support of management. Management information covers a broad
range of areas. For the purpose of this study, the focus was
on costs and schedules. A review of other requirements was
accomplished to determine the management context in which
cost and schedule information is being used.
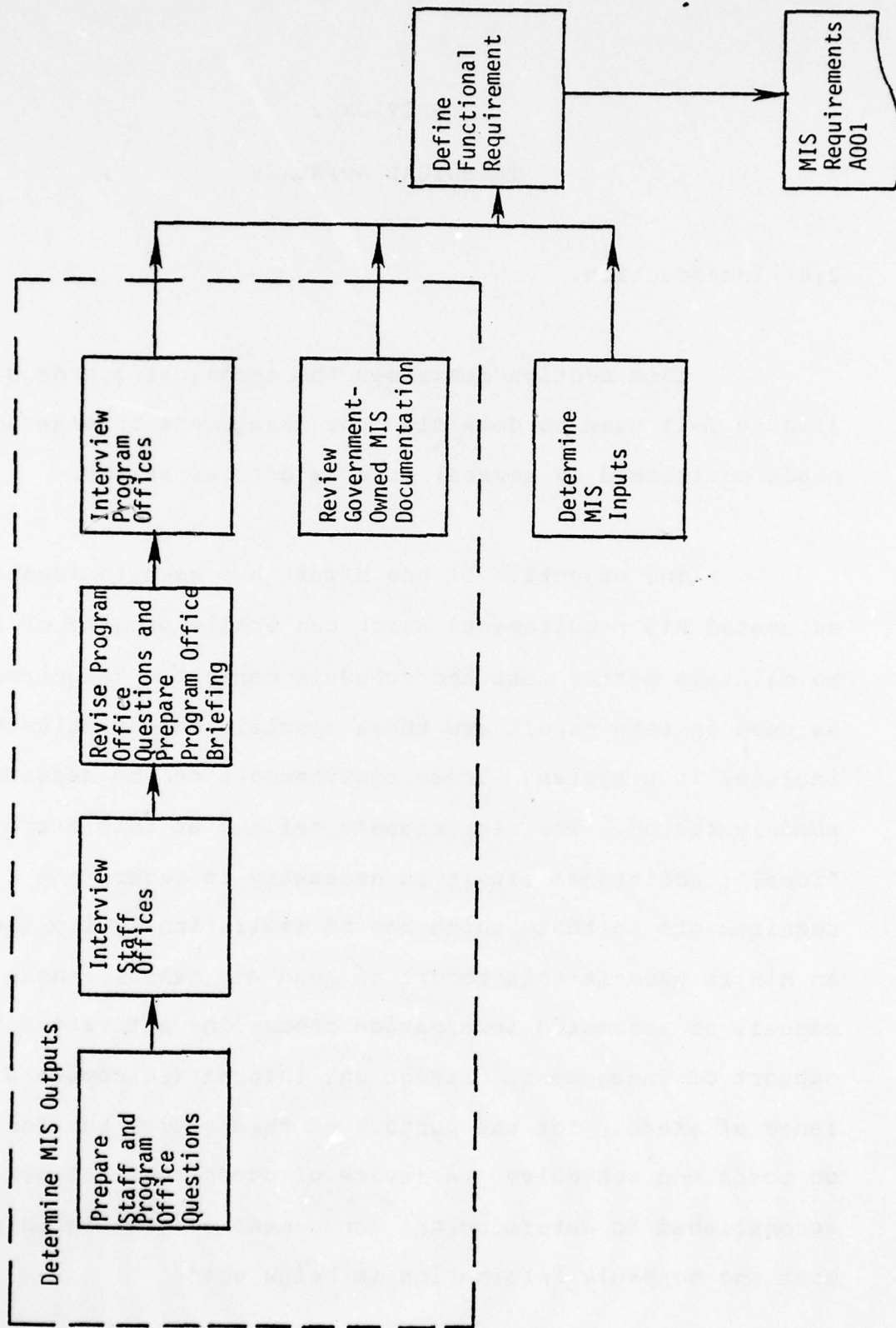
Figure 2-1. Technical Approach

2.1   Determine Management Information System Outputs

The key to an integrated MIS is the representation
of both technical and management data in a common data base
(not necessarily a single physical data base). Technical and
management data necessary for effective control of these
projects was determined as a result of interviewing staff and
program offices at ESD. The outputs of any MIS that would
fulfill the needs of a user must by necessity be a derivative
of his informational need. During the course of this study,
ESD/TOI identified those staff and program offices which were
interviewed. A guideline for the program office interviews
was prepared (Appendix 10), and four ESD program offices were
interviewed. The results of these interviews are presented
in Section 3 and Appendices 20 and 30 of this report.

2.1.1   Prepare Staff and Program Office Interviews

The objective of the staff office interviews was to
obtain information about ESD program offices in several
areas. The staff offices are capable of identifying the
operational environment of the ESD program offices. Inputs
from staff offices were used to aid in the program office
interviews. Information required from and provided to the
program offices by the staff offices was identified.

Since the objectives of the staff and program
office interviews were slightly different, a somewhat
different interviewing technique was used. While the program
office interviews were more guided and structured, the staff
office interviews were more informal.

2.1.2 Interview Staff Offices

Staff office interviews covered four general
questions:

o What information is required by program offices in
reporting outside the program office?

o What information is provided to the program
offices by the staff offices?

o What aid and assistance do the staff offices
provide to the program offices?

o What areas of an MIS should the study concentrate
upon?

2.1.3 Revise Program Office Questions and Prepare Program Office Briefing

While interviewing the staff offices, the program
office interview guideline was revised as new inputs were
obtained. Approximately one week after the end of the staff

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interviews a final draft of the program office interview guideline (Appendix 10) was completed. At this time a general review meeting was scheduled to solicit comments from TOI and the staff offices interviewed.

A rough draft of a briefing to the selected program offices was prepared a week preceding this review meeting. This briefing was to explain the purpose and scope of the study, and how it was being accomplished. The briefing concentrated on the program director's information requirements.

2.1.4 Interview Program Offices

As mentioned previously, the emphasis of this study was on costs and schedules. Therefore, the program office interviews were organized to address these two areas in detail with the program director and his business management office. As a result of the emphasis on costs and schedules the following categories were identified:

o Primary Concerns - These concerns include costs and schedule areas in which minimum automation assistance is available.

- Cost

- Schedules

- Data Management

- Planning

o Secondary Concerns - These concerns include areas
where the government has developed automated
capabilities. However, these capabilities require
further development, application, training, and
organizational acceptance. These secondary concerns
impact several of the primary concerns listed above
and have been included in order to aid in
understanding the primary concerns, specifically
costs and schedules.

- Requirements Analysis

- Requirements Traceability

- Configuration Control

- Clerical Assistance, e.g., automated
documentation

In the categories identified by the program office directors,
two major areas were investigated:

o   Reports currently used

o   Information desired but not available

For those requirements identified other determinations were
made such as:

o   Frequency of need

o   Current status of capability (e.g., manual or
automated)

o   Automation desirability

o   Use of the information

o   User of the information

The program office's business management personnel were relied upon for detailed information to assist in these determinations.

2.1.5 Review Government-Owned MIS Documentation

In parallel with the preparation for the interviews and during the interviewing, documents of government-owned management information systems were reviewed. The ESD and National Technical Information System (NTIS) automated libraries were searched on the subject of management information. The large number of abstracts identified by the search were reviewed. The relevant documents reviewed are listed in the selected bibliography (Appendix 90).

2.2 Determine MIS Input

MIS inputs were defined which correlated with output data gathered in the interview task. Subsequently, the inputs were further broken down to locate the specific sources of their origin. At this point in the study, the minimization of the quantity of input data was not an objective. Some reduction of the input data was achieved during the course of the MIS requirements definition.

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Additional analysis and the reduction of the quantity of input data was planned for in a later phase of this project but was not accomplished due to early termination of this study.

2.3 Define Functional Requirements

The definition of the functional requirements of the MIS began by analyzing the results of the ESD staff and program office interviews. In analyzing the interview data, the information system aspects required by regulations or directives were extracted. In addition, those aspects which the program office directors believe are required for the effective program office management and technical functions were identified. Once all the required and desired management system outputs were identified, a computer data base description of each output was developed. As a separate task, the information which the program offices receive (inputs) was identified and a data base definition of each input was also developed. The relationships between the outputs and inputs was not a primary consideration. At this point in the study, it was the intent to define these independently. The next step was to define the high-level functions which link the inputs and the outputs together. These functions and the input/output definitions at this

stage were characteristically high level functional
requirements and represented the high level relationships
without consideration or emphasis on implementation aspects.
In essence, the data base definition represented only the
global functional requirements of the MIS. This approach
provided the means of generating a definition of the MIS
requirements as revealed by the interview and analysis
activities without being troubled with the problems of
inconsistencies and incompleteness. More importantly,
however, the data base represented a complete repository of
all the information identified or associated with the MIS as
a result of the interviews and subsequent analysis.

     At this point in the study, the process of reducing
the global aspects of this MIS definition could proceed. The
clarification of the requirements proceeded in an iterative
manner. As more refinements were generated, the data base
definitions were corrected, and the impacts on other aspects
of the MIS were determined and refined. At the conclusion of
the initial phase of this study, and as represented in this
report, the definition of the MIS requirements represents a
range of detailed information from high-level global aspects
to intermediate and lower-level functional requirements.
This refinement process was a continuing aspect of this phase
of the study, and it was an aspect that would have continued
into the later phases of this project.

SUMMARY OF ESD INTERVIEWS

3.0 Introduction

During the course of this project, discussions were held with several ESD staff and program offices to identify the management information requirements which each of these offices believe need improvement. Discussions were held with two ESD staff offices (the Directorate of Acquisition Support, and Technical Integration Division (TOST)) and four divisions within the Comptroller's Office (AC). Four program offices were also interviewed. They were OCN/TRACALS, OCL/PAVE PAWS, DCV/SATIN IV, and YW/E-3A (AWACS). This section summarizes the findings of these separate interviews. A complete description of the interviews is presented in Appendices 20 and 30 of this report.

3.1 TOST Interviews

TOST emphasized the need for standardization of the information exchanged between all agencies and commands involved in the acquisition process. Although liaison personnel have proven to be useful conduits for intra-command

communications, the exchange of information across commands

and agency lines needs improvement by standardization of

terminology.

From TOST's point of view the information areas of

special concern are as follows:

o   Standardization of terminology, Automated Data
Processing data elements and computer programs for
similar systems in order to enable collection and
comparison of cost/schedule data.

o   Common hierarchies for operational requirements,
system hardware/parts, system software (Computer
Program Configuration Items), functional specialties
(Work Breakdown Structure, engineering specification
trees, configuration/engineering change proposal
accounting, work unit codes, parts breakdown and
provisioning lists).

o   Development of efficient, user-oriented optimum
repair level analysis and logistics support analysis
computer programs

o   Development of realistic life-cycle-cost models

3.2 AC Interviews

The concerns of the four offices interviewed within

the Comptroller's Office are similar. Therefore, the results

of these interviews are presented collectively for AC rather

than individually. From AC's point of view the specific

management information concerns for program offices are

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estimating, scheduling, budgeting, planning, analyzing, and forecasting.

First, the schedule and cost estimating process should be standardized. A single methodology applied to each program office can provide a savings in the manpower required to generate the estimates, decrease the workload of the staff office, and provide for a better understanding between the program office and the staff personnel. The development of a single methodology facilitates feedback leading to refinements which will increase budgeting accuracy.

Second, determination of tasking and manpower requirements is manually accomplished and needs improved methods.

Third, detailed budgeting methods for annual budget submissions need to be developed, and the budgeting process performed by the staff and program office needs further definition and improvement.

Fourth, not only does the program office need the assistance of computer-aided tools in the preparation of various plans and documents, but there is also a real need for identifying the inconsistencies between various planning

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activities. The development of the project planning
information should allow for an interface between planning
activities, as well as provide the ability to determine the
impact of system requirement changes (e.g., on budgets and
schedules).

Fifth, the program office should be able to
communicate progress to external agencies or other commands.

Finally, the program office should be able to
project future problems (e.g., in schedule and cost) in
order to make necessary adjustments.

3.3 ESD Program Office Interviews

Four ESD program offices were interviewed during
the course of this project. They were OCN/TRACALS, OCL/PAVE
PAWS, DCV/SATIN IV, and YW/E-3A. Each of these program
offices identified two primary areas of concern: timeliness
of cost data received from the contractor, and processing
engineering change proposals (ECPs).

First, the cost data available from contractors
through CPRs, CSSRs, and CFSRs does not satisfy the program
office's informational needs nor the requirements to report

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progress to higher command levels. In most cases this data
lags weeks behind the real events. A more timely means of
transmission and evaluation of contractor cost data is
needed.

Second, ECP review consumes a considerable amount
of program office human resources. The number of ECPs being
processed is increasing in the program offices interviewed;
however, the methods employed in the review process are
primarily manual. The ability to track the ECP process and
to evaluate an ECP's impact on the established requirements
of the system, as well as on cost and schedule, were
identified as primary concerns. Automation was viewed as
highly desirable.

Finally, one program office (OCN) identified the
need for the ability to produce contract documents
(Statements of Work, and Specifications) in a more methodical
fashion. Information system assistance in this area has been
accomplished in some ESD program offices, but has not been
addressed on a more global basis within ESD. This need is
more apparent in basket program offices such as OCN, where
more than one system specification and statement of work is
being developed at a given time. However, the need is
apparent in all program offices when the development of a

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specification or statement of work is initiated. At this time, each ESD program office proceeds with the RFP preparation by a manual process which requires attention to numerous contracting regulations at the same time the program office is attempting to finalize the user's requirements. Assistance in requirements definition and contract document preparation was identified as being an area where information processing can make significant contributions to the ESD acquisition process.

SECTION 4

DISCUSSION OF MIS REQUIREMENTS

4.0 Introduction

This section presents the functional requirements
of an integrated MIS for the control of technical and
management data within an ESD program office. The MIS
requirements were developed using a computer-aided analysis
tool. In order to facilitate the understanding of the MIS
requirements produced by this analysis tool, this section
begins with a brief description of the tool and its
report-generation capabilities. Once these general concepts
have been introduced, the actual MIS requirements are
presented in a series of computer-generated reports with
supporting text.

4.1 CADSAT Overview

The MIS requirements associated with this study
were defined and analyzed by project personnel employing a
computer-aided analysis tool called Logicon Extended CADSAT
(Computer-Aided Design Specification and Analysis Tool).

CADSAT is a large computer program package which has evolved from university research (1) concentrating on developing a means for describing information processing systems and for recording and analyzing the descriptions in a machine processable form. In 1973 ESD/TOI initiated an advanced development project to acquire a computer assisted requirements analysis capability which would facilitate the system requirements definition activities in ESD system program offices. CADSAT was acquired as a result of the ESD/TOI advanced development project and has been used experimentally in several ESD program offices, most notably the Joint Surveillance System (JSS) program office. CADSAT was used during the course of this project to define:

    o   the functions of the MIS

    o   the quantities of data flowing into, within, and
        out of the MIS

    o   the interface points between the MIS and its
        environment

    o   the attributes (values) of the MIS functions,
        interfaces, and data

(1) University of Michigan has developed software under ESD/TOI contract F19628-76-C-0197 to support CADSAT. Also other related work is performed under the University of Michigan ISDOS Project. The extended version used in this project is a modification developed by Logicon under ESD/OCU contract F19628-76-C-0218 to facilitate applications to large military systems.

The MIS requirements were not entered directly into the computer in their original conceptual form. CADSAT requires that the functional requirements entered into CADSAT computer files be organized into a hierarchical model representing the top down functional breakout of the system being defined. The methodology associated with CADSAT further requires the generation of unique names for each function in the model. In addition, the data flowing into, within, and out of the MIS being defined must be explicitly identified. Once the MIS model was determined, it was entered into CADSAT computer files by following prescribed format conventions and by typing the information into computer files via interactive communication terminals. The MIS requirements files were then utilized by other CADSAT computer programs which analyzed the requirements definition and generated various reports. The process of CADSAT report generation, review/analysis, and updating the computer requirements definition data base continued for several iterations. This methodology provided for visibility into the MIS definition.

CADSAT provides a means of describing information system requirements by the identification of a number of types of objects and the relationships between them. Objects

which are involved in creating, storing, or using the
information from the MIS are identified (INTERFACES or REAL
WORLD ENTITIES). The physical units by which data enters or
leaves the MIS are identified (INPUTS and OUTPUTS). Units of
data are described (SETS, ENTITIES, GROUPS, and ELEMENTS)
followed by the functions (PROCESSES) which operate on the
data. The dynamic aspects of the MIS are described by
stating the conditions which trigger events over time and the
activities which result from the events (CONDITIONS and
EVENTS). Finally, the size of the MIS is described by
stating the parameters which define size (System Parameters).
Each of these aspects is more fully described in the
following paragraph.

The CADSAT MIS requirements definition includes
three basic components as illustrated in Figure 4-1. These
are the MIS PROCESS structure, MIS data structures, and the
relationships between the MIS PROCESSES and data.

First, the MIS functions (1) are organized in a
top-down hierarchical manner. That is, the top function
(PROCESS) is the management-information-system. Under this
PROCESS are other PROCESSES. The hierarchical breakout of
PROCESSES (process structure) continues for as many other
additional lower PROCESS levels until the functions of the

_____
(1) Note: For the purpose of this study, CADSAT PROCESSES
are equivalent to MIS functions
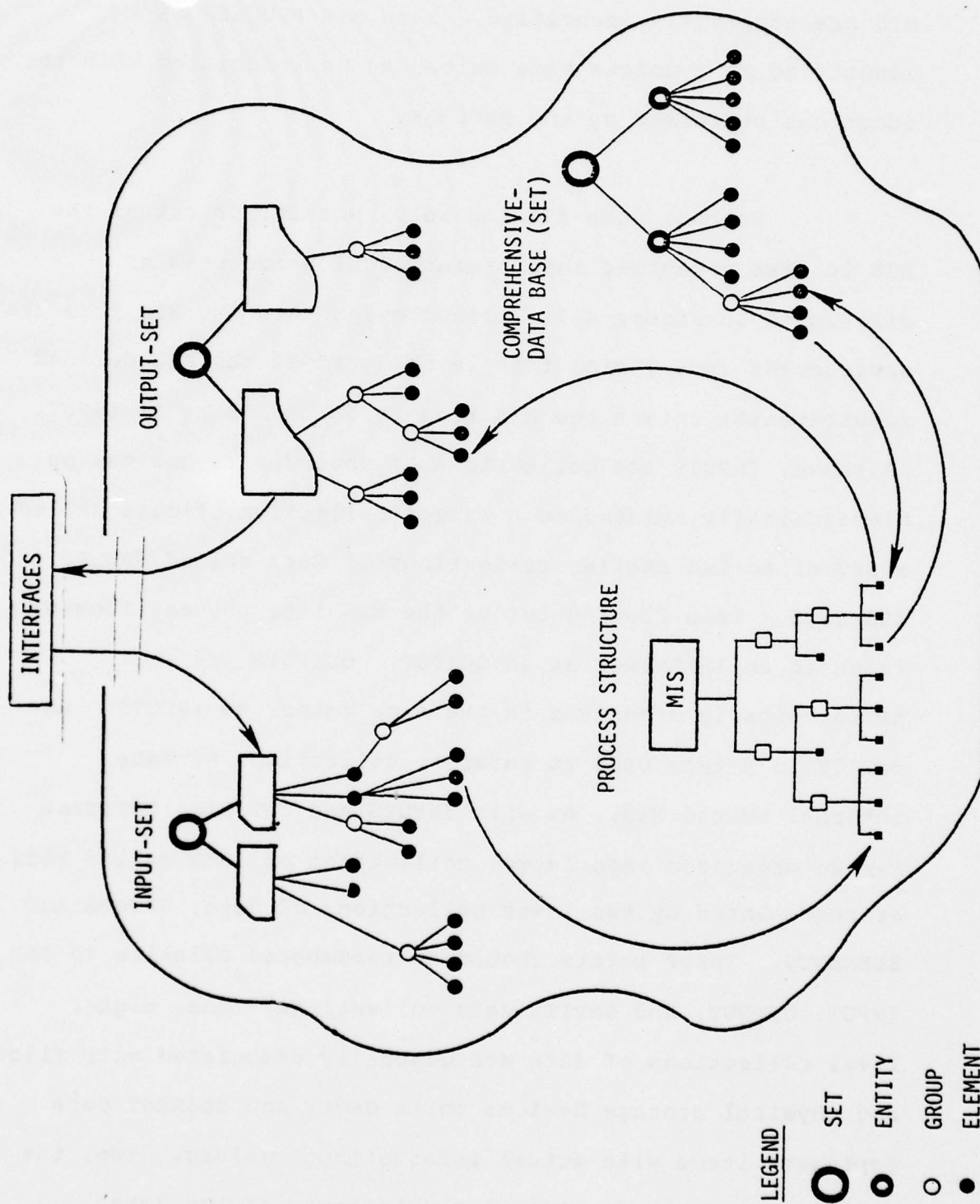
Figure 4-1 Schematic Diagram of CADSAT defined MIS, Structures and Data Flow

LEGEND

● SET
◉ ENTITY
○ GROUP
● ELEMENT

MIS are completely identified. Each MIS PROCESS is
identified by a unique name which can be associated with the
functions performed by the PROCESS.

Second, data flowing into, within, or out of the
MIS is also organized into hierarchical structures as
diagrammed in Figure 4-1. Data flowing into the MIS from the
environment (everything that is not part of the MIS defined
requirements) enters the MIS from an INTERFACE as an INPUT.
As shown, INPUTS are collections of stored data and may be
hierarchically related to a larger collection of data called
a SET or to two smaller collections of data called GROUPS and
ELEMENTS. Data flowing out of the MIS into the environment
exits to an INTERFACE as an OUTPUT. OUTPUTS are
hierarchically organized in the same manner as INPUTS. An
ENTITY is a term used to refer to collections of data
internal to the MIS. As with INPUTS and OUTPUTS, ENTITIES
can be organized into larger collections of data called SETS
or represented by two lower collections of data, GROUPS and
ELEMENTS. Three points should be remembered relative to the
INPUT, OUTPUT, and ENTITY data collections. One, higher
level collections of data are generally associated with files
and physical storage devices while GROUP and ELEMENT data
represent items with actual informational values. Two, the
definition of the functional requirements of the data

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structures (also process structure) proceeds from the top of the hierarchy structure and continues down until the level of detail satisfies the known requirements of the MIS. That is, some branches of these structures will naturally extend beyond the level of detail of other branches in the same structure as the definition of the MIS requirements are identified and entered into the computer files. Third, the relationship between higher levels of PROCESSES more directly corresponds to the higher levels of the data structures.

Finally, the third component of the CADSAT MIS requirements definition includes information which describes the relationships between the PROCESSES in the process structure and the various data sublevels contained in the input, output, and comprehensive-data-base SETS of the MIS. These relationships include linking the PROCESSES which receive/generate the information to INPUTS/OUTPUTS or internal units of information. This effectively defines the data flowing into, within, and out of the MIS as illustrated in Figure 4-1. In addition the dynamic behavior of the MIS is described by identifying the conditions or situations which trigger events and the actions which result in the events. Further MIS descriptions are included to define various MIS parameters such as size and other quantities or qualities of the MIS.

4.2   Overview of CADSAT Report Formats

This section describes five different types of
CADSAT report formats. This description will facilitate the
understanding of the specific CADSAT MIS reports at the
conclusion of this section. Although the reports themselves
appear to be complex in nature, they present the MIS
requirements in a manner which illustrates the data base in a
human readable format. The five types of reports selected
are the Process Structure Report, the Formatted Problem
Statement Report, the Contents Report, the Data Process
Report, and the Name List Report. Each of these reports will
be described in general terms in the following subsections.
These descriptions provide a brief but detailed understanding
of each report format; however, the reader, who desires only
an overview of the MIS reports contained in this study, is
encouraged to skip this technical discussion and proceed to
section 4.3 where the specific reports describing the MIS are
presented.

4.2.1 Process Structure Report

The purpose of the process structure report is to
present the hierarchy of PROCESSES (functions) defined in the

MIS. This report format is an aid to analysts in maintaining consistency in the MIS process structure using the CADSAT methodology. Since the MIS process structure is defined in a top down approach, the project analyst can review the process structure report to determine that all the PROCESSES have been defined, named correctly and inserted into the hierarchical breakdown at the proper level. The process structure report presents the process structure under three headings: COUNT, LEVEL, and NAME. NAME presents the name of the PROCESS in the structure, LEVEL presents the level number associated in the name corresponding to its position in the process structure, and COUNT presents the position (line) in the report where the PROCESS name is printed out. Each level is indented to further accent the idea of a hierarchical breakout of the MIS. A summary section for the report provides a count (under the COUNT heading) of the number of names presented at a given level (as designated by the LEVEL heading).

4.2.2 Formatted Problem Statement Report

The purpose of the formatted problem statement is to present all descriptive information about any one or more names in the MIS requirements data base. This report presents all information available for all selected PROCESS

names in the data base and its relationships with other objects in the data base. The format of this report is easily understood by observing those included in Appendix 50. A formatted problem statement of all MIS names effectively gives a complete output of the MIS requirements data base.

4.2.3 Contents Report

The purpose of the contents report is to allow the analysts to view the entire data structures (all levels) described in the CADSAT MIS requirements definition data base. The contents report presents a hierarchical breakout of all levels of data below selected data types (ENTITIES, INPUTS, OUTPUTS, SETS). All names which these types consists of are designated as level 2 names. This hierarchical breakout continues to all sublevels until the data structure of the selected data types are completely presented. Each name of the selected data type is identified by a number (1*, 2*, etc.) designating its position in the hierarchical list.

4.2.4 Data Process Report

The purpose of the data process report is to show the interaction between MIS information (data - SETS, INPUTS, OUTPUTS, ENTITIES, GROUPS, ELEMENTS) defined and the

MIS PROCESSES. The report also shows the data dependencies among MIS PROCESSES and possible deficiencies in the descriptions of the MIS PROCESS. The data process report generated for this study presents all the data required for each particular MIS PROCESS. This form of data process report aids in identifying PROCESS names which do not interact with data or are not consistently defined with respect to the manner in which they use data. The data process report focuses on two matrices generated by CADSAT using the MIS requirements definition in the computer.

The first matrix (data process interaction matrix) shows the relationships between data types (SETS, INPUTS, OUTPUTS, ENTITIES, GROUPS, ELEMENTs) on the left hand edge of the matrix (rows) and the MIS PROCESSES which are itemized across the top of the matrix (columns). The relationship of a data type to a PROCESS is identified in the matrix by an entry value (r, u, d, a, f, 1, or 2) at the intersection of a row and column. The legend of these entry values is included in the report listing. The second matrix (data process matrix (incident)) produced in the data process report shows the relationship between each PROCESS to all other MIS PROCESSES based on the information contained in the first matrix. (1) In this square formatted matrix (the rows and

(1) Note: This implies that the second matrix does not indicate all the relationships between the PROCESSES

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columns are numbered identically and represent the PROCESSES
in the columns of the first matrix) an asterisk(*) at the
intersection of a particular row and column of the matrix
designates that the PROCESS represented by the row derives or
updates some information which is used by the PROCESS
represented in the column.

4.2.5 Name List Report

The purpose of this report is to present an
alphabetized list (dictionary) of all names in the MIS
requirements data base. The name type (ATTRIBUTE,
ATTRIBUTE-VALUE, CONDITION, EVENT, INTERVAL, SET, INPUT,
OUTPUT, ENTITY, GROUP, ELEMENT, PROCESS, INTERFACE, and
others) and the synonyms associated with each name are
presented in columns on the report. This report format is
easily understood by observing the name list included in
Appendix 80.

4.3 Detailed CADSAT Description of the MIS

The purpose of this paragraph is to describe each
MIS report included in Appendices 50 through 80. Since the
five report types have been described in the preceding
paragraphs, the descriptions contained in the following

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paragraphs will concentrate on certain key points concerning the MIS.

As stated earlier, the requirements definition of the MIS presented in this study and the CADSAT-generated reports presented in the appendices should be reviewed with the following points in mind. This study represents the results of the definition of the MIS capabilities envisioned by the ESD staff and program office personnel interviewed. The data base developed represents the complete set of requirements revealed by the interviews. The MIS requirements identified herein would need additional review before any design and implementation of a MIS could proceed. In essence, the MIS represented in the following reports shows the "ideal" concept as envisioned by the personnel interviewed and as evaluated by study personnel.

4.3.1 MIS Process Structure Report

The MIS Process Structure (Appendix 40) represents the hierarchical breakout of all PROCESSES (functions) of an ESD program office MIS. As seen in this report, the MIS is broken down into three level 2 PROCESSES: (count 2) user-functions, (count 45) operations-support, and (count 56) mis-maintenance. Each of these level 2 PROCESSES is again

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broken down into more subprocesses. Each subprocess further
identifies the functions of the PROCESS immediately above
and, as stated earlier, the sum of the functions of the
PROCESSES at any level in the process structure represents
the total functions of the PROCESS at the next higher level.
For instance, the MIS, user-functions, reporting-
capabilities are (count 4) life-cycle-cost-analysis,
(count 9) financial-planning-tracking, (count 14) schedule-
planning-and-tracking, (count 20) requirements-analysis,
(count 29) traceability-analysis, (count 35) configuration-
accounting, (count 36) ecp-impact-analysis, (count 37)
problem-tracking, and (count 40) user-requested-nonstd-
analyses. Review of the process structure in conjunction
with the detailed information contained in the formatted
problem statement report (section 4.3.2 and Appendix 50) will
provide a complete description of each PROCESS and its
functions.

4.3.2 MIS Formatted Problem Statement Report

        As discussed earlier, the formatted problem
statement report merely dumps all the available information
on each object desired in an easily readable format. The
report included in this study represents the data known for
all the MIS PROCESSES. For example, the PROCESS (function)

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for the MIS can be found between lines 1 and 11 of this report (Appendix 50). This section of the report identifies the PROCESS name (management-information-system), synonyms (mainsy, mis), textual description, and the subparts (PROCESSES below the MIS, i.e., subprocesses). In another example, the problem-tracking PROCESS section of the formatted problem statement (lines 393 - 405) is linked to a memo by a CADSAT statement in line 401. The actual memo (problem-tracking-examples) appears between lines 416 and 428. In addition, the problem-tracking PROCESS is a subprocess to the reporting-capabilities PROCESS (line 404)

4.3.3 MIS Contents Reports

A thirty page contents report has been included in this study. This is the contents report for the MIS selected data types (ENTITIES, INPUTS, OUTPUTS, and SETS) as described in section 4.2.3.

The contents report included in Appendix 60 is divided into three SETS: the input-set, output-set, and comprehensive-data-base. The MIS input-set is presented in the first section of the report (level 1: 1*, lines 1 through 200). This section is followed by the output-set (level 1: 2*, lines 1 through 577). The last SET is the

comprehensive-data-base (level 1: 3*, lines 1 through 222).

For each of these three sections, the level 1 data types are

broken down into additional levels (2,3,4,5,6). The

following example demonstrates how to read the contents

report. The input-set (1*) can be broken down into ten level

2 INPUTS (lines 1, 55, 100, 132, 151, 167, 184, 198, 199,

200). The system-acquisition-plan-init (INPUT, line 1) is

further broken down into thirty (level 3) groups and

elements.

INPUTS flow into the MIS from the environment

(everything that is not part of the MIS defined requirements)

from an INTERFACE. These MIS INPUTS (input-set, 1*) are

collections of stored information which are hierarchically

broken into successive levels much like the process

structure.

The MIS OUTPUTS in this report (output-set, 2*)

represent the information which flows from the MIS to the

environment (to an INTERFACE). MIS INTERFACES represent all

objects which are involved in creating, storing or using the

information flowing into or out of the MIS. These may be

organizations, persons, or devices belonging to other

systems.

Finally, the last SET (comprehensive-data-base, 3*)
represents that information which is entirely within the MIS
environment. This information is accessed by the MIS
PROCESSES in accomplishing its functions.

4.3.4 MIS Data Process Report

As described earlier, the data process report
represents the relationships of information (data) in the MIS
to the MIS PROCESSES by means of a matrix called the data
process interaction matrix. In addition, a second matrix
contained in this report (the process interaction matrix
(incidence)) shows the relationship of each MIS PROCESS to
all other MIS PROCESSES. The remainder of this section will
describe some aspects of the two matrices contained in the
MIS data process report (Appendix 70).

First, the data process interaction matrix
represents the relationships between the MIS information
(data - SETS, INPUTS, OUTPUTS, ENTITIES, GROUPS, ELEMENTS)
defined and the MIS PROCESSES. The side of the matrix (rows
or i) represents the MIS information (data), while the top of
the matrix (columns or j) represents the MIS PROCESSES. The
matrix is preceded by a complete list of row (data types) and
column (PROCESSES) names. The relationship between each MIS

information type and the MIS PROCESSES is identified in the matrix by an entry value (r, u, d, a, f, 1, or 2) at the intersection of a row and column. The legend of these entry values is presented immediately above this first matrix in the report. The following three examples demonstrate how to interpret the data process interaction matrix presented in this study (Appendix 70). As seen in this report, the weekly-cost-updates (GROUP, row 24 or i) is received or used by the MIS generate-cfsr function (PROCESS, column 11 or j) according to the entry value (r) in the matrix at the intersection of the row (24) and column (11), page 70-7. In addition, this same GROUP is also received or used by the MIS generate-cpr function (PROCESS, column 10 or j). A third example is the current-cfsr-report-date (ELEMENT, row 31 or i) which is updated by the MIS generate-cfsr function (PROCESS, column 11 or j), page 70-8.

The second matrix presented by the data process report is the process interaction matrix (incidence). This report merely shows the relationships between each MIS PROCESS (as itemized in the columns of the first matrix) to all other PROCESSES in the MIS. (1) In this square formatted matrix the rows and columns represent all MIS PROCESSES. Where an asterisk(*) appears in the intersection of a row and

(1) Note: This implies that the second matrix does not indicate all the relationships between the MIS PROCESSES, but merely those which are exhibited by the first matrix.

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column, it means that something derived or updated by a PROCESS on the side of the matrix (row or i) is used by a PROCESS on the top of the matrix (column or j). For instance, something derived or updated by the input-processing-capabilities function (PROCESS, row 33 or i) is used by the generate-network-data function (PROCESS, column 16 or j), page 70-20. (1)

4.3.5 MIS Name List Report

The MIS name list report (Appendix 80) is the final report included in this study. This report merely presents all the names in the MIS (data types, PROCESSES, and others) in alphabetical order. This report is easily understood by observing the name list included in Appendix 80.

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(1) Note: The apparent lack of information contained in the MIS interaction matrix (incidence) contained in this report is due to the generation of this type of report by CADSAT as described in the previous note.

SECTION 5

SUMMARY OF RESULTS and RECOMMENDATIONS

5.0 Introduction

This section presents a summary of conclusions and recommendations concerning the requirements for an integrated MIS for ESD program offices.

5.1 Summary of Results

This section presents a list which summarizes the program office MIS needs relative to four areas: cost/budgeting, scheduling, ECP evaluation and control, and plans and contract preparation/control. There is considerable overlap between these areas, as should be expected in an integrated information system. This overlap is evident in the MIS functional requirements presented in section 4 and the appendices. These four areas are summarized in the following subsections.

5.1.1 Cost/Budgeting: Program offices and ESD staff offices emphasized the following cost and budgeting needs:

- developing a standardized cost estimating process

5-1

- generating realistic life cycle cost models

- generating the annual budget call submissions

- determining the status of project cost (tracking cost)

- determining the cost impacts of requirement changes and performance deviation (e.g., projected cost adjustments, loss of funds, underruns, overruns)

- projecting future cost problems from analysis of available information

- receiving accurate and timely cost expenditures (labor hour expenditures)

- developing standard terminology between various system acquisitions regarding cost preparation and reporting

5.1.2 Scheduling: Program offices and ESD staff offices

emphasized the following scheduling needs:

- developing a standardized schedule estimating process

- determining the status/progress of the project

- determining schedule adjustments resulting from requirement changes and performance deviation.

- projecting future schedule problems from analysis of all available data

- developing standard schedule terminology across similar system acquisitions

5.1.3 ECP Evaluation and Control: Program offices

emphasized the following ECP needs:

- determining the impacts of ECPs on system requirements

- determining the status of all ECPs in the program office (ECP tracking)

5.1.4 Plans and Contract Preparation/Control: Program offices and ESD staff offices emphasized the following planning and contract preparation needs:

- developing a standardized approach for defining the functional and component breakouts of systems

- developing a means of assessing the impacts of requirements changes to established plans and documents (Specifications, etc)

- developing a means of identifying the inconsistencies and incompleteness of the system requirements

- ability to produce plans and contract documents in a timely manner (clerical functions)

5.2 Recommendations

5.2.1 Automate a Standardized Cost Method

A consistent analytical methodology to forecast financial requirements of a system is needed. This process can best be accomplished by automating certain aspects of the cost estimating and budgeting activities, and integrating the information into a program office MIS which would be

responsive to the unique requirements of each acquisition, the program office personnel, and the external informational needs of concerned commands and staff agencies.

5.2.2 Provide ECP Support

Although an MIS cannot replace the technical evaluation of an ECP by the analyst, certain features of an automated system can facilitate other activities associated with the ECP evaluation and approval cycle. These features are the ability to maintain accurate tracking histories or records of ECPs handled by the program office and the ability to do impact analysis of an ECP relative to the systems requirements definition.

5.2.3 Provide Management Tracking

There is a general need for many other automated tracking features within the program office. In addition to the ECP tracking function, there are requirements for maintaining records, and reporting on a variety of subjects:

- Manpower planning, control (manpower-schedule)

- Project scheduling, control (milestone-schedule and network-chart)

- Deliverables scheduling, control, reporting (cdrl-schedule)

5-4

- ECP evaluation, control, reporting
  (ecp-impact-analysis and ecp-status)

- System requirements analysis

- Text processing, contract document preparation

5.2.4 Pursue a Prototype Application

In order to proceed beyond this study, it is recommended that some prototype application be pursued with a single ESD program office. A prime target for this prototyping would be the E-3A program office which is one of the largest acquisitions currently employing several MIS functions: weekly cost estimating, CDRL tracking, and data access by the contractor.

5.2.5 Need for Joint Involvement

Finally, the need for an integrated MIS at ESD is closely tied to the activities of the program office and the requirements peculiar to the ESD method of system acquisition. The successful application of any integrated MIS will depend on the interest and capabilities of an ESD support agency or contractor in establishing a prototype MIS. The involvement of a staff office would facilitate the applications of the MIS to other program offices, and remove

this burden from the target program office.

APPENDIX 10

PROGRAM OFFICE INTERVIEW GUIDELINE

1. What are the primary SPO Director decisions?

   o Criticality

   o Frequency

   o Desirability of more or better information

2. What reports/reporting currently supports each decision in item 1, if any?

   o Formal

   o Informal

   o Internal

   o External

   o Basis for requirement (AFR, etc.)

3. How is each item in 2 reported?

   o Detail

   o Summary

   o Hard Copy (standard form, letter)

   o Verbal (briefings)

4. When is each item in 2 reported?

   o Daily

   o Monthly

   o Quarterly

   o Annually

5. Who is each item in 2 reported to?

6. What is the input for each item in 2?

7. what is the source of input for each item in 2?

   o Contractor

   o SPO

   o Other (AFSC, TOST, ACE, ROC, PMD, OEP, etc.)

8. In what form is each input originally?

   o Detail

   o Summary

   o Hard Copy (Status Report)

   o Verbal (briefings)

9. At what level(s) in the decision-making process is the information used?

10. What is the disposition of each item in 6 after the reporting requirement, for which it is used is fulfilled?

   o Disposed of, how?

   o Filed

      -In what form?

      -How, if form of the information changes?

      -How long is this specified in the authority to be identified in question 1?

11. which items in 2, if any, are automated?

   o How much?

   o Where?

   o Turn-around (from information query to system generated results)?

   o Is it used?

12. Which items in 6, if any, are automated?

   o How much?

o Where?

o Turn-around (from information query to system generated results)?

o Is it used?

13. Which items in 2 require the most manpower to generate?

o Estimated manpower (manhours, computer-time)?

o Why?

14. Does the SPO have a requirement for one-time information requests?

o How many?

o How often?

o How fast?

o What type (information retrieval, with calculations, with formatting)?

15. What turn-around times, from query to system generated results, would be considered the limits of the following categories?

o Excellent

o Good

o Fair

o Poor

o Useless

16. What other SPO information management tasks not covered in 2 to 15 would be of help if automated?

o Answer 2 to 13 for each

17. What information is reported or should be reported downward to the SPO?

o Answer 2 to 13 for each

18.   Request examples of each item in 1, 2, 6, 14, 16, and
17.

APPENDIX 20

ESD STAFF OFFICE INTERVIEWS

20.0 Discussions were held with the Directorate of Acquisition Support, Technical Integration Division (TOST) and four offices within the comptroller's office (AC).

20.1 One of TOST's primary concerns is minimizing life cycle costs. Part of this concern is an effort to increase management visibility across the life cycle, standardize information reporting, and increase the utility of information collected. TOST's official charter is as follows:

> Serves as staff OPR in the areas of reliability, maintainability, availability, system/cost effectiveness, micro-electronics, quality assurance, configuration management, systems analysis, human factors, value engineering, engineering design reviews, computer programs acquisition management, system engineering management, test and evaluation, corrosion control, nondestructive inspection/testing, survivability/ vulnerability, electromagnetic compatibility, and for laboratory support to ESD program offices.

TOST emphasized the development of standardization of information across the lines of management. At least four commands are involved in the development and operations of

Air Force systems. These are the implementing, operating
(user), training and logistics (supporting-maintenance)
commands. While intra-command communications is improved by
the usage of liaison personnel, further improvements could be
made by standardizing the terminology and processing of
management information between the commands.

From TOST's point of view the information areas of special
concern are as follows:

>   o   Standardization of terminology, Automated Data
>   Processing data elements and computer programs for
>   similar systems in order to enable collection and
>   comparison of cost/schedule data.
>
>   o   Common hierarchies for operational requirements,
>   system hardware/parts, system software (Computer
>   Program Configuration Items), functional specialties
>   (Work Breakdown Structure, engineering specification
>   trees, configuration/engineering change proposal
>   accounting, work unit codes, parts breakdown and
>   provisioning lists).
>
>   o   Development of efficient, user-oriented optimum
>   repair level analysis and logistics support analysis
>   computer programs
>
>   o   Development of realistic life cycle cost models

20.2 Within the Comptroller's Office the two divisions and
four offices which were interviewed have the following
official charters:

>   o   Programs/Budget Division (ACB): ACBB is
>   responsible for (1) the centralized
>   direction, policy guidance, and

administration of the ESD budget formulation
and execution, and (2) the ESD program to
enhance the quality and performance of the
people working in Business Management.

o Program Management Support Branch (ACBB):
Serves as the focal point for policies and
procedures affecting Business Management
Office activities and organization. Plans,
organizes, and administers the ESD training
program for enhancing the quality and
performance of Business Management personnel.
Conducts Staff Assistance Visits to Business
Management Offices to improve management
practices, solve procedural problems, and
promote a "lessons learned" crossfeed within
ESD. Provides technical assistance in such
areas as scheduling and documentation,
supports the Resource Utilization Committee
(RUC), and serves as the Secretariat for the
Business Management Board. Works closely and
in coordination with the Financial Management
Branch to insure that the assistance being
provided to Business Management Offices is
responsive to the requirements of the budget
formulation and execution process.

o Financial Management Branch (ACBF)
Formulated, justifies, and monitors the
execution of the ESD RDT&E, Aircraft
Procurement, and Other Procurement
Appropriations budgets. Serves as the focal
point for the policies and procedures for
financing the development and acquisition
programs. Analyzes and reports financial
trends, problems and financing proposals.
Responsible for the Program Objective
Memorandum, Annual Call (Budget Update), and
presentations for the Hq USAF-Hq AFSC Program
Financial Reviews and the ESD Business
Management Board.

o Cost Analysis Division (ACC): Responsible
for preparation of immediate and long range
estimates of development, investment and
operating costs in terms of programs and
systems. Develops plans, programs, and
schedules for the collection, validation, and
analysis of cost data. Manage the Cost and
Economic Aid Information System. Extends

technical cost estimating assistance to all
System Program Offices, and participates in
special cost studies parametric and economic
analysis, and source selection evaluation
studies. Assists with the development and
implementation of Command policy for the
Cost/Schedule Control Systems Criteria
(C/SCSC) programs. Maintains the Selected
Acquisition Information System.

o Cost Estimating and Analysis Branch
(ACCE): Determines and validates resource
implications of alternative courses of action
through preparation, evaluation, and
documentation of total cost and resources
studies in support of planning, programming,
and budgeting functions. Prepares resource
estimates to support planning before the
Systems Program Office (SPO) has been
established, provides technical cost
estimating assistance for established SPOs
and cost analysis of selected ongoing
programs. Validates and prepares
recommendations concerning the adequacy of
the data base methodology, documentation of
estimates forwarded to higher echelons.
Prepares independent cost estimates,
participates in special cost studies and
source selection activities as required.
Maintains program/project continuity through
functional alignment of cost estimating
groups.

o Cost Management Systems (ACCI): Supports
cost estimating requirements through data
analysis and development of generalized cost
estimating relationships, cost factors,
learning curves, price and wage indices, and
specific program studies. Conducts research,
develops new or modified existing cost
information and data systems, including
mathematical models, other computerized
systems and tools, data plans and work
breakdown structures. Provides analysis of
cost information at established milestones in
the program life of selected on-going
programs and acts as focal point for estimate
tracking program. Reviews procurement
packages for financial management
requirements in conjunction with the Cost

Estimating and Analysis Branch. Collects,
classifies, stores and retrieves historical
cost data, including SAIMS, data, proposal
and other cost reports. Provides Cost
Library service to ESD, other AF Commands,
and other DOD agencies. Provides focal point
for SAIMS, to include Cost Information
Reports (CIR) and contractor performance
measurement activities. Provides support to
SPOs and division staff in the
implementation, evaluation, and validation of
SAIMS, C/SCSC, MIL STD 881 (WBS), cost
models, and other computerized cost
estimating or information system. Develops,
implements, and monitors command policy,
procedures, and methods for Cost Schedule
Control System Criteria (C/SCSC) program
policy, procedures, and methods for
contractor validation exercises.
Participates in the command program to
develop systems, tools and cost methodology
to improve the efficiency and credibility of
AFSC's cost analysis capability.
Participates in source selection activities
as required

20.2.1 The concerns of personnel in the separate

Comptroller's Offices were similar. Therefore, the results

can be best summarized collectively for AC rather than

individually. From AC's point of view the specific

management information concerns for program offices are:

o   Estimating

o   Scheduling

o   Budgeting

o   Planning

o   Analyzing

o   Forecasting

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20.2.1.1 First, Estimating: Estimates form the basic foundation upon which most decisions are made. Estimates become more important when they form the basis of large resource commitments. Two applicable forms of estimating are schedule and cost estimating.

> - Schedule estimating is the expenditure of project resources in terms of time.

> - Cost estimating is the expenditure of project resources in dollars and cents.

Most estimating is currently done on a manual basis by each program office in conjunction with the AC staff offices. To a great degree this will always be true. However, the difficulty of this task can be greatly decreased through the use of automated estimation procedures. The estimating algorithms used by AC and the program offices should be further identified and analyzed for integration into a MIS. This provides several benefits:

> - Decrease in program office estimating work load

> - Decrease in AC staff office work load

> - Better understanding between program offices and the AC staff office, since AC will be using the same integrated set of estimating algorithms tailored to the needs of the particular program office.

20.2.1.2 Second, Scheduling: Once the initial estimates are derived as described above, the program office prepares a program schedule. During the pre-contract phase the program office updates the program schedule to include more accurate and pertinent information. In most acquisitions, the program office includes the program schedule in the procurement package for the contractors review. This schedule represents the governments desires or requirements, and the contractor prepares his schedule for government review and approval based on the information contained in the governments pre-contract schedule.

20.2.1.3 Third, Budgeting: It is extremely difficult to separate the activities associated with scheduling from those of budgeting. The schedule is theoretically translated into actual cost (budgeted requirements) of the human and material resources necessary to accomplish the tasks over the life of the acquisition cycle. However, ESD budget requirements are prepared and presented in annual requirements (slices) from the total estimated budget requirements which usually extend over many years and funding allocations. The program direction may require adjustment to reflect authorized funding or changes in funding allocations as determined and

directed above the ESD level. The ESD budgeting process is primarily accomplished on a manual basis by each program office with assistance from the comptroller's office. Although the uniqueness of each project requires the technical input from the program office, the capability to define a budgeting process for acquiring and assimilating budget information, and the generation of budget reports can be accomplished and administered by a single ESD organization. This method has been an established approach in private industry where corporate departments, large and small, prepare estimates in a prescribed manner and submit the information for inclusion in the corporate budget process. In many instances the department interactively updates its estimates directly into corporate computer files which also provides the capability for automatically allowing report capabilities at many levels above the original level of the updated departmental budget estimates.

20.2.1.4 Fourth, Planning: The initial planning activities of estimating, scheduling, and budgeting are accomplished in the early conceptual and validation phases of the acquisition cycle and adjustments to these issues continues throughout the acquisition cycle. However, when these time and money issues are approved, the planning relative to the system being acquired is initiated. Numerous planning documents are

prepared in response to the Program Management Directive (PMD) and other directives. Some of these are the Program Management Plan (PMP), personnel support planning documents, procurement plan (PP), determinations and findings (D&F), integrated logistics support plan (ILSP), computer resources integrated support plan (CRISP), environmental assessments, test and engineering master plans (TEMP), request for proposal (RFP) including statements of work and system specifications, and source selection plans and source selection criteria.

The entire planning function associated with the composite information in these plans constitutes the governments' intent and desires in the acquisition of a system. Since each of these plans are developed and maintained primarily by manual methods, the informational threads between the various plans are difficult to accurately maintain. An impact made in one planning area makes a high demand of program office resources to analyze and adjust associated plans, briefings, and documentation.

20.2.1.5 Fifth, Analyzing: As described above planning is a continuous process which must reflect changes necessitated by events, and the program office must constantly respond to external events which are a results of governmental and

contractor initiated inquiries or impacts during the system acquisition process. The program office must perform various studies on an on-going basis in order to monitor the acquisition process. In addition, the program office must assimilate quantities of information from the contractor. The results of this analyses is presented in various reports, reviews, and presentations made to the program manager and higher echelons. Most of the analysis performed by the program office is manual and many types of automation would be greatly useful in this area. These include rather simple cross referencing computer programs for the WBS, CPR, CFSR, and CIR to much more complex computer programs with analysis and alternative algorithms for resource scheduling and allocation.

20.2.1.6 Finally, Forecasting: Not only must the current status of a projects progress be ascertained by various analysis activities, but also forecast must be made of the future status of the project. Early problem recognition and reporting and tradeoff analysis allow the program office to make the necessary adjustments and reduce risks which could impact the progress of the project. As is true with analysis, this is mostly a manual task; this work could be aided by many automated tools. Any automation in the financial areas would ultimately aid in forecasting.

APPENDIX 30

ESD PROGRAM OFFICE INTERVIEWS

30.0. Discussions were held with four ESD Program Offices:
OCN/TRACALS, OCL/PAVE PAWS, DCV/SATIN IV, and YW/E-3A. This
appendix details the concerns of each program office
interviewed.

30.1 OCN/TRACALS (Traffic Control Approach and Landing
Systems)

TRACALS is a multi-project office (basket program
office) with 12 major projects and is managed by a single
program office director.   Each project is headed by a
program manager and many are projects in the multi-million
dollar category. Most of the contracts are fixed price
incentive and one is a level of effort contract. The OCN
program director's main concern is the timeliness of cost
data. Cost information such as the CPR runs almost two
months behind the real events. This needs to be changed so
that cost data is received by the program director within two
weeks of the actual end of the month. Technical problems,
however, need to be reported within two days of the problems
observance.

A secondary concern that the TRACALS program director experiences is the impact of engineering change proposals (ECPs). ECPs occur about twice a week and require an analysis and response to several important issues within approximately thirty days. Questions of primary concern are:

    o   Does the ECP constitute a change in scope?

    o   Is the ECP cost and time effective?

    o   How does the proposed change benefit the government?

Similarly, when a new requirement is levied on a program office there seems to be little anticipation of the impact, on the current system requirements. In order to assess the impact an evaluation of the task and budget has to be performed to determine if the change can be made without impacting the requirements of existing resources. If the impact can not be absorbed by existing resources, additional resources must be defined and accommodations made to the acquisition process. Although there is no requirement to report change statistics, a capability to track the history of all changes to the requirements would facilitate the ECP change evaluation and change procedures. At present configuration control is primarily a manual process and each

program within the TRACALS program office has one or more
configuration managers who perform this task on a full or
part time basis as required. A requirement that is rather
unique to a basket type program office is the continuous
generation of procurement specifications which is
accomplished in OCN about twice a year. A single procurement
must be supported by two full time typists for a period of
about three months and may incorporate as many as five or six
revisions.

30.2 OCL/PAVE PAWS (Phased Array Warning System)

PAVE PAWS is a single 48 month procurement
requiring the coordination of both military and non-military
support agencies. Again, the program director's main concern
is the timeliness of cost data. Information in the CPRs and
the CFSRs runs at least thirty days behind the real events
and is practically outdated. The currency of the reports
needs improvement. PAVE PAWS experiences difficulty in
knowing the status of the funds and schedules relative to
governmental support agencies involved in the acquisition.
The status of the disposition of funds as allocated by
various agencies is practically non-existant. There is a
real need for timely reporting by all support agencies
outside the jurisdiction of the program office.

Informational support should be achieved along a similar
basis to that of the reporting requirements of ESD
contractors. This would allow the program office which is
responsible for monitoring funds expenditures and schedules
the ability to receive all the necessary information to
accurately assess the program status.

A secondary concern of the PAVE PAWS program
director is handling engineering change proposals. ECPs
have occurred at a rate of two per month over the past
fourteen month period and have been increasing at a rate of
two or three a month over the past six months. This trend is
expected to continue for another six months. Each ECP
requires the support of ten PAVE PAWS specialist over a
thirty day period. A program office configuration manager,
one cost manager, and eight technicians are involved in each
ECP action. This task group must address the following
issues for each ECP:

      o Does the ECP constitute a change in scope?

      o Is it a change to a necessary system requirement?

      o Will it result in a cost and/or schedule impact?

      o Will it result in a system performance impact?

      o Was the original system requirement not feasible?

30.3 DCV/SATIN IV (SAC Automated Total Information Network)

        SATIN IV is a program for developing an integrated
SAC command-wide digital record communications system to meet
SAC's requirements for command-control and support data
transmission into the 1990s. A primary concern of the
program office director is in trying to balance actual cost
and schedules with budget allocations. His major endeavor is
to keep the funding for each fiscal year in line with the
allocated budget. In order to accomplish this task he must
also plan for possible budget cuts, be prepared to assess the
impact, and provide for program adjustments as necessary.
Another important part of his job is preparing and
presenting numerous briefings for higher reviews. Again, a
major problem is the timeliness of contractor information
(CPRs). This information needs to be available on a weekly
basis to the program office. It must detail the contractor's
man hour expenditures.

        Another major concern of the program director is
engineering change proposals. ECP analysis is, as was true
for PAVE PAWS, a very complex process, since each ECP must be
evaluated against all program functions and often impacts
another government agency. In addition, this program office
has a need and has developed an in-house capability to trace

30-5

requirements, not only back to the system specification, but all the way back to the documents which describe the requirements. This capability is significant in evaluating the impact of each ECP.

30.4 YW/E-3A AWACS (Airborne Warning and Control Systems)

AWACS is a multi-billion dollar program to provide a survivable airborne air surveillance capability and command, control and communications functions. There are some 140 program office personnel and some 45 MITRE personnel augmenting the program office resources. The E-3A aircraft has been in the production phase for some time. Cost, schedules and the timeliness of information are again the major issues which concern the AWACS program office director. In a program office the size of AWACS, production phase information on cost and schedules must be acquired and analyzed in a timely manner.

First, Costs: Timely cost information is needed on a weekly basis. The CPR system was built for E-3A by MITRE and there was no history or trend analysis in the original version. The statistical algorithm to forecast the bottom line has also been changed. However, the E-3A CPR system has more error checks than the base version and has the

capability of doing computer generated graphics using CALCOMP
plotters. The CPR comes from the contractor broken down
functionally by WBS. The CPR system does not do any analysis
of costs based on indices, i.e. analysis of the cost
performance index and schedule performance index. A
functional flow of the E-3A's current CPR system is
illustrated in Figure 30-1.

Second, Schedule: Schedules should be tracked
simply and concisely so projected problem areas can be
addressed before they cause schedule slips. At present, E-3A
is using a government owned data base management system
(VENUS) for data manipulation of a milestone data base. The
milestones and schedule data comes from the contractor as a
data item deliverable on a monthly basis and the information
is entered into the VENUS data base. The analysis sections
and report generation capabilities are augmented with program
office developed FORTRAN programs. The system is used mainly
in the batch (over-the-counter) mode. The prime contractor
is now using the data base through an interactive terminal.

Of the some 2000 milestones in the VENUS data base,
about 65 to 80 milestones are processed each week. Of these
40 to 50 are revisions indicating overdue deliverable and 25
to 40 are new deliverable milestones which are to be entered.

30-7
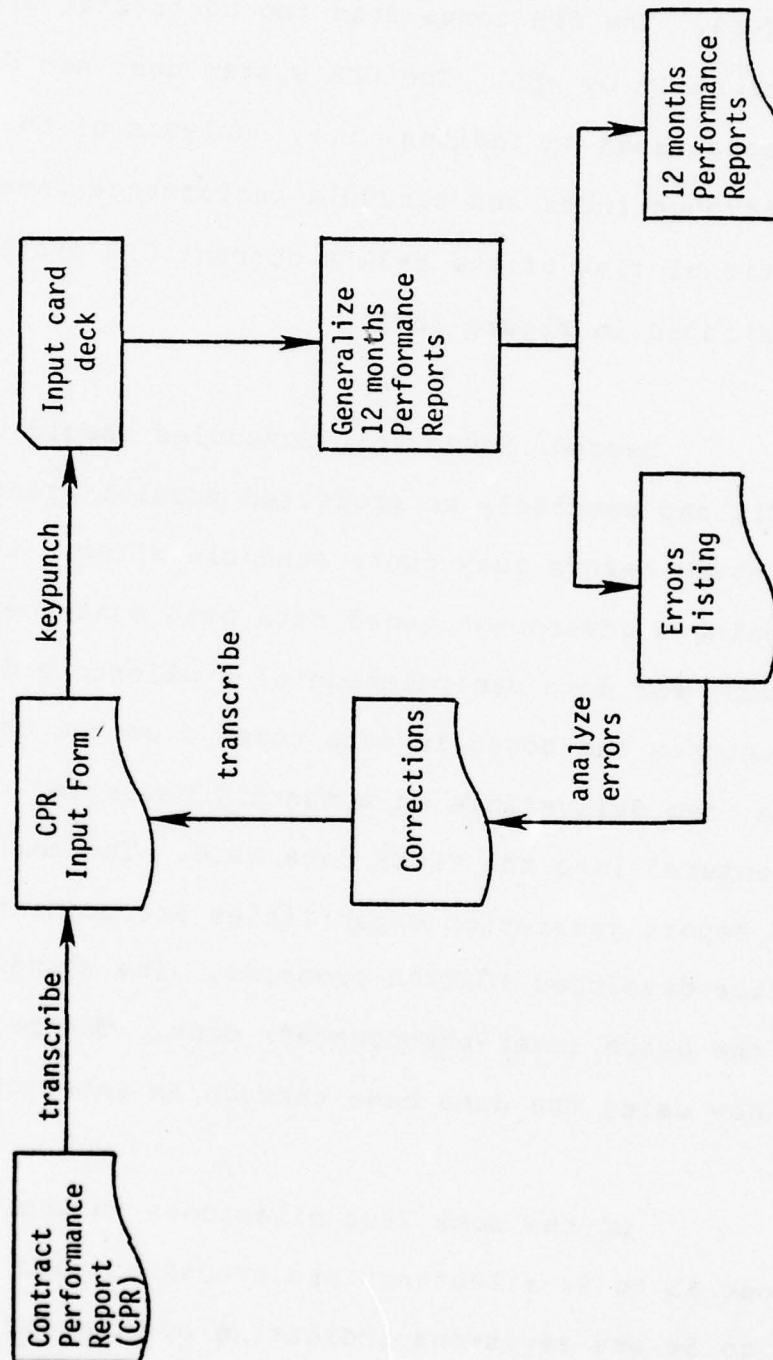
Figure 30-1. E-3A CPR System, Functional Flow

The diagram shows the following flow:

- **Contract Performance Report (CPR)** — transcribe → **CPR Input Form**
- **CPR Input Form** — keypunch → **Input card deck**
- **Input card deck** → **Generalize 12 months Performance Reports**
- **Generalize 12 months Performance Reports** → **12 months Performance Reports**
- **Generalize 12 months Performance Reports** → **Errors listing**
- **Errors listing** — analyze errors → **Corrections**
- **Corrections** — transcribe → **CPR Input Form**

Milestones are added to the schedule for any areas of high technical or cost risks. A PERT type network was used for the first E-3A. Presently Gantt charts by WBS are created by the program office from the VENUS data base outputs.

Turnaround for the schedule report is about 24 hours, due to computer time scheduling and partially due to the inability for VENUS to produce a long series of reports quickly. VENUS was developed for laboratory use and does not include the processing options or documentation to be useful beyond its current use by the AWACS program office. In general it is a simple query and update system and its marginal documentation makes it difficult for training purposes.

The program director's second concern is engineering change proposals. ECPs occur at a rate of three to six a week. Engineering change proposals, changes in user requirements, and contractor performance monitoring must be managed on a strict basis. This process is accomplished primarily on a manual basis and ensures that the system will meet the performance specifications within the proposed cost. Configuration Control coordinates the analysis and review process of ECPs to ensure completeness in the analysis and review as accomplished by program office and MITRE technical staff.

APPENDIX 40

CADSAT MIS PROCESS STRUCTURE

count level name

```
 1   1 management-information-system
 2      2 user-functions
 3         3 reporting-capabilities
 4            4 life-cycle-cost-analysis
 5               5 development-cost-estimating
 6               5 operations-cost-estimating
 7               5 optimum-repair-level-analysis
 8               5 maintenance-cost-estimating
 9            4 financial-planning-tracking
10               5 generate-cpr
11               5 generate-cfsr
12               5 generate-estimated-costs
13               5 generate-cssr
14            4 schedule-planning-and-tracking
15               5 generate-cdrl-schedule
16               5 generate-network-data
17               5 generate-milestone-schedule
18               5 generate-manpower-schedule
19               5 generate-ecp-status
20            4 requirements-analysis
21               5 requirements-relation-analysis
22               6 hierarchial-analysis
23               6 functional-control-analysis
24               6 data-flow-analysis
25               5 requirements-evaluation
26               6 system-performance-analysis
27               6 system-completeness-assessment
28               6 system-consistency-analysis
29            4 traceability-analysis
30               5 requirements-design-trace
31               5 requirements-product-trace
```

40-2

process structure

count	level	name
32	5	requirements-test-trace
33	5	design-test-trace
34	5	product-test-trace
35	4	configuration-accounting
36	4	ecp-impact-analysis
37	4	problem-tracking
38	5	generate-problem-status-report
39	5	generate-problem-impact-report
40	4	user-requested-nonstd-analyses
41	3	input-processing-capabilities
42	4	command-processing
43	4	data-acceptance-checking
44	4	data-conversion
45	2	operations-support
46	3	user-modes
47	4	batch
48	4	interactive
49	3	output-formating
50	4	standard-report-generation
51	4	plotter
52	4	gantt-chart-generation
53	4	network-chart-generator
54	3	data-access-security-control
55	3	text-processing
56	2	mis-maintenance

level	count	level	count	level	count	level	count	level	count
1	1	2	3	3	6	4	18	5	22
	6	6							

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APPENDIX 50

CADSAT MIS PROCESS DESCRIPTIONS

1 process   management-information-system;
2   synonyms are: mainsy,
3   mis;
4   description;
5 The management information system requirements rpresent a required
6 operational capability desired by the program offices interviewed. It
7 includes information currently processed manually or automatically, and
8 information which is desired by not available.;
9   subparts are: user-functions,
10   operations-support,
11   mis-maintenance;
12
13 process   user-functions;
14   synonyms are: usefun,
15   usfu;
16   description;
17 The user functions are those that the user of the MIS interfaces with
18 directly.;
19   subparts are: reporting-capabilities,
20   input-processing-capabilities;
21   part of: management-information-system;
22
23 process   reporting-capabilities;
24   synonyms are: reca,
25   repcap;
26   description;
27 The reporting capabilities contain the requirements to generate data
28 items contained in the reports.;
29   subparts are: life-cycle-cost-analysis,
30   financial-planning-tracking,
31   schedule-planning-and-tracking,
32   requirements-analysis,
33   traceability-analysis,
34   configuration-accounting,

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```
35              ecp-impact-analysis,
36              problem-tracking,
37              user-requested-nonstd-analyses;
38  part of:    user-functions;
39  utilizes:   user-modes,
40              output-formating;
41  derives:    selected-acquistion-report
42  using:      comprehensive-data-base;
43                                      life-cycle-cost-analysis;
44  process
45  synonyms are:  licycoan;
46  description;
47  The life cycle cost analysis function processes all development,
48  production, operations, and maintenance cost data and projects
49  total life cycle costs.  It includes a capability to make
50  hypothetical changes to parameters to evaluate cost impacts.;
51  keywords:   analyzed;
52  generates:  life-cycle-cost-report;
53  subparts are:  development-cost-estimating,
54                 operations-cost-estimating,
55                 optimum-repair-level-analysis,
56                 maintenance-cost-estimating;
57  part of:    reporting-capabilities;
58  utilizes:   generate-estimated-costs;
59
60  process                              development-cost-estimating;
61  synonyms are:  decoes;
62  description;
63  The development cost estimating function includes costing of all R&D,
64  design, development, and production.;
65  part of:    life-cycle-cost-analysis;
66
67  process                              operations-cost-estimating;
68  synonyms are:  opcoes;
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```
69   part of:      life-cycle-cost-analysis;
70                 optimum-repair-level-analysis;
71   process
72   synonyms are: oprelean,
73                 orla;
74   keywords:     analyzed;
75   generates:    opt-repair-lev-anal-report;
76   part of:      life-cycle-cost-analysis;
77   derives:      allocation-cost-dollar-value
78   using:        repair-description,
79                 component-item-record,
80                 end-item-depot-record;
81   derives:      share-of-cost-dollar-value
82   using:        repair-description,
83                 component-item-record,
84                 end-item-depot-record;
85   derives:      percent-of-total-time
86   using:        repair-description,
87                 component-item-record,
88                 end-item-depot-record;
89   derives:      opt-repair-lev-anal-report
90   using:        comprehensive-data-base;
91   derives:      number-of-units
92   using:        component-item-record;
93   derives:      minimum-cost-value
94   using:        repair-description,
95                 depot-cost-dollar-value,
96                 intermediate-cost-dollar-value,
97                 discard-cost-dollar-value;
98   derives:      minimum-cost-alternative
99   using:        repair-description,
100                depot-cost-dollar-value,
101                intermediate-cost-dollar-value,
102                discard-cost-dollar-value;
```

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```
103    derives:    life-cycle-cost-report
104    using:      comprehensive-data-base;
105    derives:    intermediate-cost-dollar-value
106    using:      minimum-cost-alternative,
107                facility-cost,
108                component-item-record,
109                end-item-depot-record,
110                repair-description,
111                inventory-cost,
112                initial-trainning-cost,
113                life-cycle-period;
114    derives:    discard-cost-dollar-value
115    using:      minimum-cost-alternative,
116                life-cycle-period,
117                component-item-record,
118                end-item-depot-record,
119                repair-description,
120                order-packing-shipping,
121                force-basing;
122    derives:    depot-cost-dollar-value
123    using:      minimum-cost-alternative,
124                facility-cost,
125                component-item-record,
126                end-item-depot-record,
127                repair-description,
128                initial-trainning-cost;
129
130  process                                  maintenance-cost-estimating;
131    synonyms are:  macoes;
132    part of:       life-cycle-cost-analysis;
133
134  process                                  financial-planning-tracking;
135    synonyms are:  fipltr;
136    description;
```

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137 The financial planning and tracking function performs all tasks related
138 to financial, budget, and costing with the exception of processing
139 data being entered into the MIS. The function is used by a program
140 office planning a system acquisition, planning for specific contract
141 efforts, tracking of development/production contracts, and
142 financial forecasting.;
143   subparts are: generate-cpr,
144   generate-cfsr,
145   generate-estimated-costs,
146   generate-cssr;
147   part of: reporting-capabilities;
148
149 process   generate-cpr;
150   synonyms are: gecp,
151   gencpr;
152   keywords: analyzed;
153   generates: cost-performance-report;
154   part of: financial-planning-tracking;
155   utilizes: standard-report-generation;
156   derives: budgeted-cost-work-performed
157   using: weekly-cost-updates;
158   derives: cost-performance-report
159   using: comprehensive-data-base;
160
161 process   generate-cfsr;
162   synonyms are: gecf,
163   gencfs;
164   keywords: analyzed;
165   generates: contract-funds-status-report;
166   part of: financial-planning-tracking;
167   uses: comprehensive-data-base,
168   weekly-cost-updates;
169   updates: current-cfsr-report-date;
170   updates: previous-cfsr-report-date;

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171   updates: unliquidated-commitments;
172   updates: accrued-expenditures;
173   derives: dollar-units;
174   derives: contract-funds-status-report;
175   derives: accrued-expend-plus-commit;
176   derives: total-costs;
177   derives: forecast-billings;
178   generate-estimated-costs;
179 process
180   synonyms are: geesco;
181   keywords: analyzed;
182   generates: weapon-system-budget-estimate,
183   selected-acquistion-report;
184   part of: financial-planning-tracking;
185   utilized by: life-cycle-cost-analysis;
186   derives: weapon-system-budget-estimate
187   using: comprehensive-data-base;
188
189 process   generate-cssr;
190   synonyms are: gencss;
191   keywords: analyzed;
192   generates: cost-schedule-status-report;
193   part of: financial-planning-tracking;
194   derives: cost-schedule-status-report
195   using: comprehensive-data-base;
196
197 process   schedule-planning-and-tracking;
198   synonyms are: scplantr;
199   description;
200 The scedule planning and tracking function performs all tasks related to
201 program office schedule planning and projected schedule impact analysis.
202 It also uses contractor data to obtain schedule status and projections.;
203   subparts are: generate-cdrl-schedule,
204   generate-network-data,

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```
205                          generate-milestone-schedule,
206                          generate-manpower-schedule,
207                          generate-ecp-status;
208       part of:           reporting-capabilities;
209
210  process                                        generate-cdrl-schedule;
211       synonyms are:      gecdsc;
212       keywords:          analyzed;
213       part of:           schedule-planning-and-tracking;
214
215  process                                        generate-network-data;
216       synonyms are:      genech;
217       keywords:          analyzed;
218       part of:           schedule-planning-and-tracking;
219       derives:           schedule-data
220       using:             comprehensive-data-base;
221
222  process                                        generate-milestone-schedule;
223       synonyms are:      gemisc;
224       keywords:          analyzed;
225       part of:           schedule-planning-and-tracking;
226
227  process                                        generate-manpower-schedule;
228       synonyms are:      gemasc;
229       keywords:          analyzed;
230       part of:           schedule-planning-and-tracking;
231
232  process                                        generate-ecp-status;
233       synonyms are:      geecst;
234       keywords:          analyzed;
235       part of:           schedule-planning-and-tracking;
236
237  process                                        requirements-analysis;
238       synonyms are:      rean,
```

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239
240   subparts are: reqana;
241   requirements-relation-analysis,
242   requirements-evaluation;
243   part of: reporting-capabilities;
244   utilized by: ecp-impact-analysis;
245 process   requirements-relation-analysis;
246   synonyms are: rerean;
247   description;
248
249 The requirements relational analysis performs the type of analysis
250 presently performed by CADSAT prior to initialization of system
251 development and used during development/production to identify
252 additional requirements impacted by ECPs.;
253   keywords: analyzed;
254   subparts are: hierarchial-analysis,
255   functional-control-analysis,
256   data-flow-analysis;
257   part of: requirements-analysis;
258   uses: system-specifications;
259   derives: cadsat-reports;
260   derives: logicon-cadsat-reports;
261
262 process   requirements-evaluation;
263   synonyms are: regeva;
264   description;
265 The requirements evaluation function is performed on a single
266 specification which has already undergone requirements relational
267 analysis. It determines the completeness, consistency, and
268 performance adequacy.;
269   subparts are: system-performance-analysis,
270   system-completeness-assessment,
271   system-consistency-analysis;
272   part of: requirements-analysis;

```
273  process                                    system-performance-analysis;
274     synonyms are:  sypean;
275     description;
276  The system performance analysis function determines the consistency
277  between performance requirements and enables the determination of
278  performance impacts resulting from possible requirement changes.;
279     see-memo:       system-performance-memo;
280     keywords:       analyzed;
281     part of:        requirements-evaluation;
282
283
284  memo                                         system-performance-memo;
285     synonyms are:  sypeme;
286     description;
287  The analysis of performance requirements is essential prior to
288  development and during development to determine the impact of
289  requirements changes.  CADSAT can be used to determine other related
290  requirements but cannot be used to evaluate things such as computer
291  timing or sizing impacts. The type of performance analysis that is
292  required is typically obtained from a system functional simulator. It
293  is anticipated that the data to drive the simulator will be extracted
294  directly from a CADSAT data base.;
295     applies to:  system-performance-analysis;
296
297  process                                    system-completeness-assessment;
298     synonyms are:  sycoas;
299     description;
300  The system completeness assessment function performs user defined
301  checks on the specification data base to determine if all of the
302  relevent information is present for each item.;
303     see-memo:       system-completeness-example;
304     keywords:       analyzed;
305     part of:        requirements-evaluation;
306     uses:           system-specifications;
```

307   derives: cadsat-reports;
308   derives: logicon-cadsat-reports;
309
310 memo   system-completeness-example;
311   synonyms are: sycoex;
312   description;
313 The problem of determining if a specification is complete is two-fold:
314 determination of whether the user has identified all required
315 capabilities and determination of whether all identified capabilities
316 have been fully specified. Only the later problem can be addressed
317 by an MIS. For example, suppose that the system is an air
318 surveillance system with the FAA providing flight plans. The
319 development of this system requires complete specification of all
320 external interfaces: data content, format, frequency, and volume
321 of data. Another example might be the identification of the data
322 reduction function which does not use any data nor is tied to the
323 performance of any other functions. The problem is that systems
324 engineering failed to identify the data collection or recording
325 functions (the functions which provide the source data) and the
326 maintenance/training functions which make use of the resultant
327 data reductions.;
328   applies to: system-completeness-assessment;
329
330 process   system-consistency-analysis;
331   synonyms are: sycoan;
332   description;
333 The consistency analysis function consists of developing a CADSAT
334 data base and the performance of most of the other requirements analyses
335 functions.;
336   part of: requirements-evaluation;
337   uses: system-specifications;
338   derives: cadsat-reports;
339
340 memo   consistency-analysis-examples;

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341 synonyms are: coanex;
342 description;
343 Most of the inconsistencies in a specification document are found by the
344 initial analysis forced by the rigorous checking of the data as it is
345 entered into the data base. Additional inconsistencies are identified b
346 reviews of printouts showing the relationships between functions or data
347 Example: People writing different sections of a specification may have
348 referenced the surveillance function and implied different meanings or
349 capabilities. One may have implied processing of the radar data by the
350 signal processor at the radar site, another may have included acceptance
351 checking, and a third may have included track correlation checks.
352 Attempting to load these three functions into the computer would show
353 inconsistencies if the same terminology is used. If slightly different
354 terminology is used (the typical situation), three separate
355 structures will be shown for surveillance. The fact that there are
356 three instead of one would make the inconsistency apparent to any
357 of the three analysts.;
358
359 process   traceability-analysis;
360   synonyms are: traana,
361   tran;
362   keywords: analyzed;
363   subparts are: requirements-design-trace,
364   requirements-product-trace,
365   requirements-test-trace,
366   design-test-trace,
367   product-test-trace;
368   part of: reporting-capabilities;
369   utilized by: ecp-impact-analysis;
370   uses: system-specifications;
371   derives: logicon-cadsat-reports;
372
373 process   configuration-accounting;
374   synonyms are: codo,

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375   conacc,
376   condoc;
377 keywords: analyzed;
378 generates: config-change-status-report;
379 part of: reporting-capabilities;
380 utilizes: text-processing;
381 derives: config-change-status-report
382 using: comprehensive-data-base;
383   ecp-impact-analysis;
384 process
385 synonyms are: eciman;
386 keywords: analyzed;
387 part of: reporting-capabilities;
388 utilizes: requirements-analysis,
389   traceability-analysis;
390 uses: system-specifications;
391 derives: technical-requirements-impact;
392
393 process   problem-tracking;
394 synonyms are: protra;
395 description;
396 The problem tracking function maintains status of all problems that have
397 been identified by the program office or contractors. The function
398 assures accountability and traceability of both potential and real
399 problems which may impact costs, schedules, or technical performance of
400 the system.;
401 see-memo: problem-tracking-examples;
402 subparts are: generate-problem-status-report,
403   generate-problem-impact-report;
404 part of: reporting-capabilities;
405   generate-problem-status-report;
406 process
407 synonyms are: geprstre;
408 keywords: analyzed;

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```
409      part of:      problem-tracking;
410
411 process                           generate-problem-impact-report;
412      synonyms are:  geprimre;
413      keywords:      analyzed;
414      part of:       problem-tracking;
415
416 memo                              problem-tracking-examples;
417      synonyms are:  prtrex;
418      description;
419 Example 1: It would include the identification of all inconsistencies
420 or inadequacies in the specifications as they are identified. This
421 technique would assume that these problems do not get lost and are
422 incorporated in future spec configuration changes.
423 Example 2: It would include the identification of all test failures or
424 deficiency reports produced by program office/contractor personnel
425 during development test and evaluation or software verification and
426 validation.;
427      applies to:    problem-tracking;
428
429 process                           user-requested-nonstd-analyses;
430      synonyms are:  dabaqu,
431                     usrenoan;
432      description;
433 A specialized query cpability is required which enables the user
434 to generate specialized reports and to obtain current values
435 for selected data base elements.;
436      keywords:      analyzed;
437      part of:       reporting-capabilities;
438      derives:       special-report-data;
439
440 process                           input-processing-capabilities;
441      synonyms are:  dainacch,
442                     inprca;
```

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```
443  keywords:      analyzed;
444  receives:      configuration-change-dates,
445                 contract-description,
446                 contract-performance-data,
447                 projected-system-maint-data,
448                 system-acquisition-plan-init,
449                 system-acquisition-plan-update,
450                 task-description,
451                 system-specifications;
452  subparts are:  command-processing,
453                 data-acceptance-checking,
454                 data-conversion;
455  part of:       user-functions;
456  derives:       comprehensive-data-base;
457  derives:       db-task-description
458  using:         task-description;
459  derives:       db-system-acquisit-plan-update
460  using:         system-acquisition-plan-update;
461  derives:       db-system-acquisit-plan-init
462  using:         system-acquisition-plan-init;
463  derives:       db-projected-system-maint-data
464  using:         projected-system-maint-data;
465  derives:       db-contract-performance-data
466  using:         contract-performance-data;
467  derives:       db-contract-description
468  using:         contract-description;
469  derives:       db-configuration-change-dates
470  using:         configuration-change-dates;
471                                operations-support;
472  process
473  synonyms are:  opsu;
474  description;
475  Operations support provides all special functions required to support
476  the users data entry and retrieval. It includes batch/time share option
```

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```
477 special output formating capabilities, and text processing (required to
478 hnadle RFP packages and spec writing).;
479    subparts are:  user-modes,
480                   output-formating,
481                   data-access-security-control,
482                   text-processing;
483    part of:       management-information-system;
484
485 process          user-modes;
486    synonyms are:  usemod,
487                   usmo;
488    keywords:      analyzed;
489    subparts are:  batch,
490                   interactive;
491    part of:       operations-support;
492    utilized by:   reporting-capabilities;
493
494 process          output-formating;
495    synonyms are:  oufo,
496                   outfor;
497    subparts are:  standard-report-generation,
498                   plotter,
499                   gantt-chart-generation,
500                   network-chart-generator;
501    part of:       operations-support;
502    utilized by:   reporting-capabilities;
503
504 process          standard-report-generation;
505    synonyms are:  strege;
506    keywords:      analyzed;
507    part of:       output-formating;
508    utilized by:   generate-cpr;
509    uses:          special-report-data;
510
```

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```
511 process           plotter;
512   keywords:       analyzed;
513   generates:      plotted-schedules;
514   part of:        output-formating;
515   uses:           schedule-data,
516                   cdrl-schedule,
517                   milestone-schedule-data;
518   derives:        plotted-schedules;
519
520 process           gantt-chart-generation;
521   synonyms are:   gachge,
522                   gnchge;
523   keywords:       analyzed;
524   part of:        output-formating;
525   uses:           schedule-data,
526                   cdrl-schedule,
527                   milestone-schedule-data;
528   derives:        gantt-chart;
529
530 process           network-chart-generator;
531   synonyms are:   pechge;
532   keywords:       analyzed;
533   part of:        output-formating;
534
535 process           data-access-security-control;
536   synonyms are:   daacseco;
537   description:
538 The data access control function controls individual user access to
539 data in the MIS data base to prevent unauthorized reading or writing of
540
541 eof;
542   keywords:       analyzed;
543   part of:        operations-support;
544
```

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545 process   text-processing;
546   synonyms are: tepr;
547   keywords: analyzed;
548   part of: operations-support;
549   utilized by: configuration-accounting;
550
551 process   mismai;   mis-maintenance;
552   synonyms are: mismai;
553   description;
554 The maintenance function provides all capabilities necessary to modify
555 the MIS software, document the MIS, recover from user errors, and recove
556 from environmental problems (operating system crashes, communications
557 noise, etc.).;
558   keywords: analyzed;
559   part of: management-information-system;
560   uses: comprehensive-data-base;
561   updates: comprehensive-data-base;
562
563 eof eof eof eof eof

APPENDIX 60

CADSAT MIS DATA DESCRIPTIONS

Air Force ESD / RADC Multics
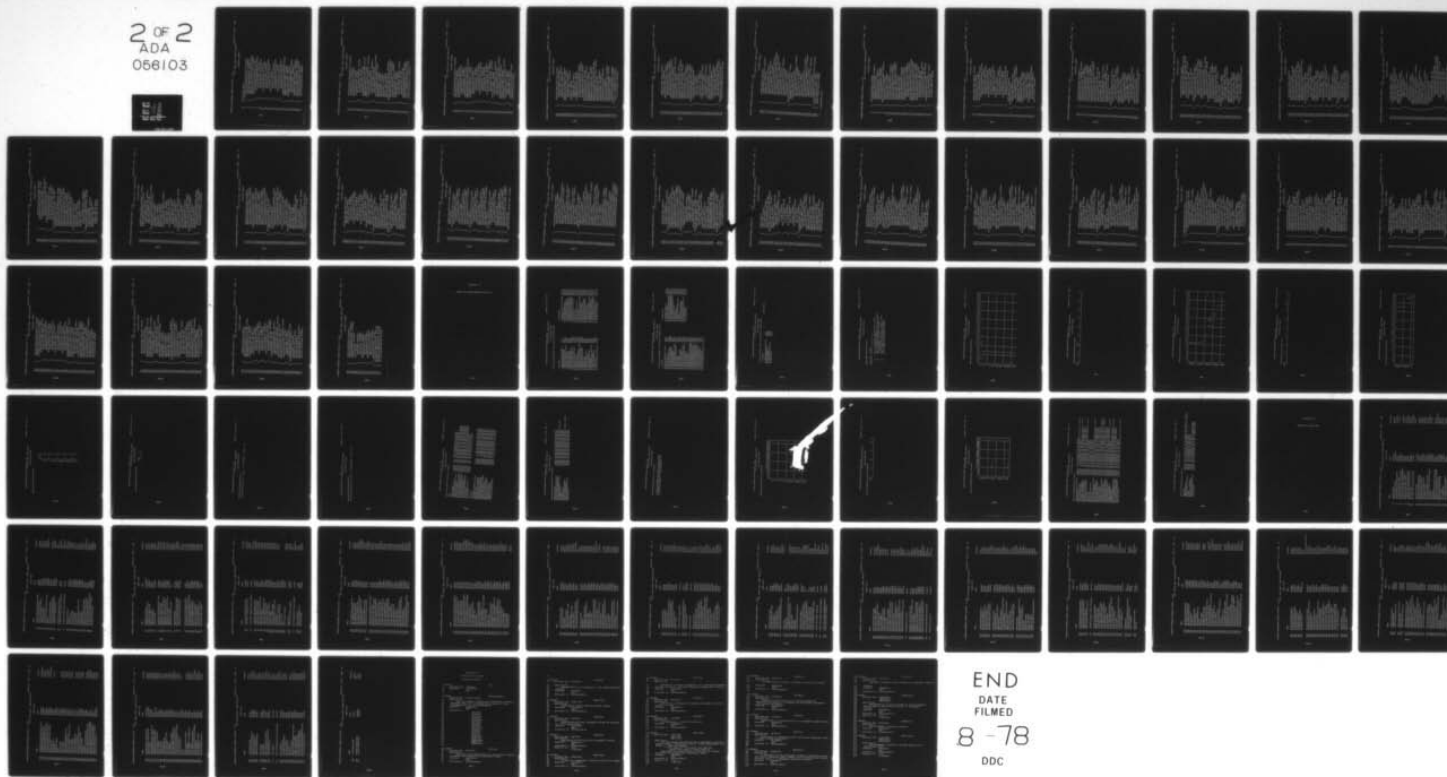
contents report

```
 1*   1 input-set (set)
 1    2 system-acquisition-plan-init (input)
 2    3 contract-funding-for-fy (element)
 3    3 contract-appropriation (element)
 4    3 appropriation-identification (group)
 5    3 funding-authorized-to-date (group)
 6    3 contract-funding-profile (group)
 7    4 unliquidated-commitments (group)
 8    5 actual-to-date (element)
 9    5 projected-by-period (group)
10    5 at-completion (element)
11    4 accrued-expenditures (group)
12    5 actual-to-date (element)
13    5 projected-by-period (group)
14    5 at-completion (element)
15    4 total-costs (group)
16    5 actual-to-date (element)
17    5 projected-by-period (group)
18    5 at-completion (element)
19    4 forecast-billings (group)
20    5 projected-by-period (group)
21    5 at-completion (element)
22    3 budgeted-cost-work-scheduled (group)
23    3 undistributed-budget (group)
24    3 production-vs-rdte (element)
25    3 program-name-number (group)
26    4 contract-program-name (element)
27    4 contract-number (element)
28    3 estimated-unpriced-work (element)
29    3 contract-budget-baseline (element)
30    3 bcws-six-months-forecast (group)
31    3 bcws-period-forecast (group)
32    3 prime-item-quantity (element)
```

contents report

33	3	est-cost-auth-unpriced-work (element)
34	3	estimated-price (element)
35	3	estimated-ceiling (element)
36	3	funds-carry-over (group)
37	3	forecasted-work (group)
38	4	not-yet-authorized-work (group)
39	4	all-other-work (group)
40	4	forecast-subtotal (group)
41	3	approved-design-to-cost-goal (group)
42	3	weapon-system-name (element)
43	3	production-planning-schedule (element)
44	3	line-item-budget (group)
45	4	line-item-description (element)
46	4	eight-year-budget (group)
47	4	total-budget-at-completion (element)
48	3	dcp-thresholds-breached (group)
49	3	dod-component (element)
50	3	system-symbol (element)
51	3	designation (element)
52	3	nomenclature (element)
53	3	popular-name (element)
54	3	mission-and-description (element)
55	2	system-acquisition-plan-update (input)
56	3	contract-funding-for-fy (element)
57	3	contract-appropriation (element)
58	3	funds-carry-over (group)
59	3	forecasted-work (group)
60	4	not-yet-authorized-work (group)
61	4	all-other-work (group)
62	4	forecast-subtotal (group)
63	3	estimated-unpriced-work (element)
64	3	contract-budget-baseline (element)
65	3	authorized-baseline-changes (group)
66	3	prime-item-quantity (element)

contents report

```
67  3   est-cost-auth-unpriced-work (element)
68  3   estimated-price (element)
69  3   estimated-ceiling (element)
70  3   units-accepted-to-date (group)
71  4       number-planned (element)
72  4       number-accepted (element)
73  3   quantities-delivered (group)
74  3   approved-design-to-cost-goal (group)
75  3   development-contracts (group)
76  3   production-contracts (group)
77  4       company-name (element)
78  4       initial-contract (group)
79  5           initial-price (element)
80  5           initial-quantity (element)
81  4       current-contract-price (group)
82  5           target-price (element)
83  5           ceiling-price (element)
84  5           current-quantity (element)
85  4       price-at-completion (group)
86  5           contractor-estimate (element)
87  5           government-estimate (element)
88  3   line-item-budget (group)
89  4       line-item-description (element)
90  4       eight-year-budget (group)
91  4       total-budget-at-completion (element)
92  3   dcp-thresholds-breached (group)
93  3   program-highlights (group)
94  3   reverences-to-other-sections (group)
95  3   major-subcontractor (group)
96  4       company-name (element)
97  4       company-address (group)
98  3   changes-since-as-of-date (group)
99  3   committed-funds (group)
        contract-description (input)
```

contents report

101	3	contract-identification (group)
102	4	contract-number (element)
103	4	contract-start-date (element)
104	4	contract-type (element)
105	3	contract-initial-price (group)
106	3	contract-type-number (group)
107	4	contract-type (element)
108	4	contract-number (element)
109	3	contractor (group)
110	4	company-name (element)
111	4	company-address (group)
112	3	at-completion-costs (group)
113	4	at-completion-budgeted (group)
114	4	latest-revised-estimate (element)
115	4	at-completion-variance (group)
116	3	bcws-period-forecast (group)
117	3	bcws-six-months-forecast (group)
118	3	management-reserve (group)
119	3	manpower-period-forecast (group)
120	3	maintenance-repair-cost (group)
121	3	manpower-six-months-forecast (group)
122	3	work-breakdown-structure-items (group)
123	3	wbs-description (group)
124	3	initial-target-cost (element)
125	3	negotiated-cost (element)
126	3	contract-target-price (element)
127	3	share-ratio (element)
128	3	contract-gen-admin-rate (element)
129	3	functional-task-category (group)
130	3	target-profit (element)
131	3	contract-ceiling-price (element)
132	2	contract-modification-data (input)
133	3	contract-identification (group)
134	4	contract-number (element)

contents report

135	4	contract-start-date (element)
136	4	contract-type (element)
137	3	adjusted-contract-price (group)
138	4	adjusted-target-price (element)
139	4	adjusted-ceiling-price (element)
140	3	negotiated-contract-changes (element)
141	3	adjusted-target-cost (element)
142	3	work-breakdown-structure-items (group)
143	3	wbs-description (group)
144	3	functional-task-category (group)
145	3	manpower-six-months-forecast (group)
146	3	manpower-period-forecast (group)
147	3	negotiated-cost (element)
148	3	contract-target-price (element)
149	3	contract-ceiling-price (element)
150	3	changes-since-as-of-date (group)
151	2	contract-performance-data (input)
152	3	weekly-cost-updates (group)
153	4	cost-item (element)
154	4	item-type (element)
155	4	actual-cost (element)
156	4	projected-cost (element)
157	3	weekly-technical-updates (group)
158	4	task-number (element)
159	4	revised-task-status (element)
160	3	cfsr-remarks (element)
161	3	latest-revised-estimate (element)
162	3	management-reserve (group)
163	3	weekly-schedule-updates (group)
164	4	descriptive-name (element)
165	4	task-schedule-element (element)
166	4	revised-schedule-element (element)
167	2	configuration-change-dates (input)
168	3	engineering-change-proposal (group)

```
169    4        change-number (element)
170    4        change-descriptive-title (element)
171    4        change-cost (element)
172    4        x-mini-board-date (element)
173    4        comments-required-date (element)
174    4        y-mini-board-date (element)
175    4        config-control-board-date (element)
176    4        procuremnt-officer-letter-date (element)
177    4        tech-agreement-letter-date (element)
178    4        contract-change-date (element)
179    4        engineering-opr (element)
180    4        configuration-control-opr (element)
181    4        procurement-opr (element)
182    4        logistics-opr (element)
183    4        change-notes (element)
184    2    projected-system-maint-data (input)
185    3        equipment-type (element)
186    3        repair-description (group)
187    4        mean-time-between-deliveries (element)
188    4        mean-time-to-test (element)
189    4        available-time (element)
190    4        demand-time (element)
191    4        required-time (element)
192    4        mean-time-between-failures (element)
193    4        non-repairable-component-rate (element)
194    4        component-weight (element)
195    4        component-repair-cycle-time (element)
196    4        repair-rates (group)
197    4        component-average-maint-time (element)
198    2    level-a-specification (input)
199    2    level-b-specification (input)
200    2    level-c-specification (input)

2*    1  output-set (set)
```

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1   2 narrative-backup (output)
 2   3 program-element-number (element)
 3   3 program-title (element)
 4   3 preparation-agency (element)
 5   3 program-description (element)
 6   3 work-to-be-performed (element)
 7   2 contract-funds-status-report (output)
 8   3 dollar-units (element)
 9   3 contract-number (element)
10   3 contract-type (element)
11   3 contract-funding-for-fy (element)
12   3 contract-appropriation (element)
13   3 previous-cfsr-report-date (element)
14   3 current-cfsr-report-date (element)
15   3 company-name (element)
16   3 company-address (group)
17   3 contract-program-name (element)
18   3 contract-initial-price (group)
19   3 adjusted-contract-price (group)
20   4 adjusted-target-price (element)
21   4 adjusted-ceiling-price (element)
22   3 work-breakdown-structure-items (group)
23   3 appropriation-identification (group)
24   3 funding-authorized-to-date (group)
25   3 accrued-expend-plus-commit (group)
26   3 contract-work-authorized (group)
27   4 definitized-work (group)
28   4 estimated-over-under-cost (group)
29   4 not-definitized-work (group)
30   4 authorized-work-subtotal (group)
31   3 forecasted-work (group)
32   4 not-yet-authorized-work (group)
33   4 all-other-work (group)
34   4 forecast-subtotal (group)

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35	3	total-funds-requirements (group)
36	3	funds-carry-over (group)
37	3	net-funds-required (group)
38	3	contract-funding-profile (group)
39	4	unliquidated-commitments (group)
40	5	actual-to-date (element)
41	5	projected-by-period (group)
42	5	at-completion (element)
43	4	accrued-expenditures (group)
44	5	actual-to-date (element)
45	5	projected-by-period (group)
46	5	at-completion (element)
47	4	total-costs (group)
48	5	actual-to-date (element)
49	5	projected-by-period (group)
50	5	at-completion (element)
51	4	forecast-billings (group)
52	5	projected-by-period (group)
53	5	at-completion (element)
54	3	cfsr-remarks (element)
55	2	cpr-baseline (output)
56	3	report-page-number (group)
57	4	current-page-number (element)
58	4	total-number-of-pages (element)
59	3	company-name (element)
60	3	company-address (group)
61	3	production-vs-rdte (element)
62	3	contract-type-number (group)
63	4	contract-type (element)
64	4	contract-number (element)
65	3	program-name-number (group)
66	4	contract-program-name (element)
67	4	contract-number (element)
68	3	report-period (element)

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contents report

```
 69   3      initial-target-cost (element)
 70   3      negotiated-contract-changes (element)
 71   3      adjusted-target-cost (element)
 72   3      estimated-unpriced-work (element)
 73   3      contract-budget-baseline (element)
 74   3      total-allocated-budget (element)
 75   3      allocation-baseline-dif (element)
 76   3      program-baseline-beg-of-period (group)
 77   3      authorized-baseline-changes (group)
 78   3      cumulative-bcws (group)
 79   3      bcws-six-months-forecast (group)
 80   3      bcws-period-forecast (group)
 81   3      total-budget (group)
 82   3      general-and-administration (group)
 83   3      undistributed-budget (group)
 84   3      program-period-end-baseline (group)
 85   3      management-reserve (group)
 86   3      total (group)
 87   2    cpr-functional-categories (output)
 88   3      report-page-number (group)
 89   4        current-page-number (element)
 90   4        total-number-of-pages (element)
 91   3      company-name (element)
 92   3      company-address (group)
 93   3      production-vs-rdte (element)
 94   3      contract-type-number (group)
 95   4        contract-type (element)
 96   4        contract-number (element)
 97   3      program-name-number (group)
 98   4        contract-program-name (element)
 99   4        contract-number (element)
100   3      report-period (element)
101   3      functional-task-category (group)
102   3      current-period-costs (group)
```

contents report

```
103   4      current-budgeted-cost (group)
104   5        budgeted-cost-work-scheduled (group)
105   5        budgeted-cost-work-performed (group)
106   4      actual-cost-work-performed (group)
107   4      current-variance (group)
108   5        schedule-variance (group)
109   5        cost-variance (group)
110   3    cumulative-costs-to-date (group)
111   4      cum-todate-budgeted-cost (group)
112   5        cumulative-work-scheduled (group)
113   5        cumulative-work-performed (group)
114   4      cum-todate-actual-work-perf (group)
115   4      cumulative-variance (group)
116   5        cumulative-schedule-variance (group)
117   5        cumulative-cost-variance (group)
118   3    at-completion-costs (group)
119   4      at-completion-budgeted (group)
120   4      latest-revised-estimate (element)
121   4      at-completion-variance (group)
122   3    general-and-administration (group)
123   3    undistributed-budget (group)
124   3    subtotal (group)
125   2  cpr-manpower-loading (output)
126   3    report-page-number (group)
127   4      current-page-number (element)
128   4      total-number-of-pages (element)
129   3    company-name (element)
130   3    company-address (group)
131   3    production-vs-rdte (element)
132   3    contract-type-number (group)
133   3    contract-type (element)
134   4      contract-number (element)
135   3    program-name-number (group)
136   4      contract-program-name (element)
```

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137	4	contract-number (element)
138	3	report-period (element)
139	3	functional-task-category (group)
140	3	current-period-actual (group)
141	3	end-of-period-actual-cum (group)
142	3	manpower-six-months-forecast (group)
143	3	manpower-period-forecast (group)
144	3	manpower-requird-at-completion (group)
145	3	total-manpower (group)
146	2	cpr-problem-analysis (output)
147	3	report-page-number (group)
148	4	current-page-number (element)
149	4	total-number-of-pages (element)
150	3	company-name (element)
151	3	company-address (group)
152	3	production-vs-rdte (element)
153	3	contract-type-number (group)
154	4	contract-type (element)
155	4	contract-number (element)
156	3	program-name-number (group)
157	4	contract-program-name (element)
158	4	contract-number (element)
159	3	report-period (element)
160	3	problems (group)
161	4	problem-name (element)
162	4	statement-of-problem (element)
163	4	results-of-analysis (element)
164	2	cpr-work-breakdown-str (output)
165	3	contractor (group)
166	4	company-name (element)
167	4	company-address (group)
168	3	production-vs-rdte (element)
169	3	contract-type-number (group)
170	4	contract-type (element)

171	4	contract-number (element)
172	3	program-name-number (group)
173	4	contract-program-name (element)
174	4	contract-number (element)
175	3	report-period (element)
176	3	contractor-signature (group)
177	4	authorized-signature (group)
178	5	signature (element)
179	5	title (element)
180	5	signature-date (element)
181	4	title (element)
182	4	signature-date (element)
183	3	prime-item-quantity (element)
184	3	negotiated-cost (element)
185	3	est-cost-auth-unpriced-work (element)
186	3	target-profit (element)
187	3	contract-target-price (element)
188	3	estimated-price (element)
189	3	share-ratio (element)
190	3	contract-ceiling-price (element)
191	3	estimated-ceiling (element)
192	3	wbs-item-costs (group)
193	4	wbs-item (element)
194	4	current-period-costs (group)
195	5	current-budgeted-cost (group)
196	6	budgeted-cost-work-scheduled (group)
197	6	budgeted-cost-work-performed (group)
198	5	actual-cost-work-performed (group)
199	5	current-variance (group)
200	6	schedule-variance (group)
201	6	cost-variance (group)
202	4	cumulative-costs-to-date (group)
203	5	cum-todate-budgeted-cost (group)
204	6	cumulative-work-scheduled (group)

contents report

```
205     6       cumulative-work-performed (group)
206     5       cum-todate-actual-work-perf (group)
207     5       cumulative-variance (group)
208     6       cumulative-schedule-variance (group)
209     6       cumulative-cost-variance (group)
210   4     costs-at-completion (group)
211     5       at-completion-budgeted (group)
212     5       latest-revised-estimate (element)
213     5       at-completion-variance (group)
214   2   cost-schedule-status-report (output)
215     3     wbs-descriptor (group)
216     3     budgeted-cost-work-scheduled (group)
217     3     budgeted-cost-work-performed (group)
218     3     actual-cost-work-performed (group)
219     3     cumulative-schedule-variance (group)
220     3     cumulative-cost-variance (group)
221     3     budget-at-completion (element)
222     3     latest-revised-estimate (element)
223     3     undistributed-budget (group)
224     3     management-reserve (group)
225   2   program-schedule (output)
226     3     system-name (element)
227     3     subsystem-name (element)
228     3     type-of-schedule (element)
229     3     schedule (group)
230     4       line-item-description (element)
231     4       period-of-completion (element)
232   2   weapon-system-budget-estimate (output)
233     3     category (element)
234     3     weapon-system-name (element)
235     3     equipment-type (element)
236     3     contractor (group)
237     4       company-name (element)
238     4       company-address (group)
```

239	3	production-planning-schedule (element)
240	3	report-control-symbol (element)
241	3	line-item-budget (group)
242	4	line-item-description (element)
243	4	eignr-year-budget (group)
244	4	total-budget-at-completion (element)
245	2	sar-section-a-cover-sheet (output)
246	3	system-symbol (element)
247	3	as-of-date (element)
248	3	designation (element)
249	3	nomenclature (element)
250	3	popular-name (element)
251	3	mission-and-description (element)
252	3	prime-contractor (group)
253	4	company-name (element)
254	4	company-address (group)
255	3	major-subcontractor (group)
256	4	company-name (element)
257	4	company-address (group)
258	3	dod-component (element)
259	3	reverences-to-other-sections (group)
260	2	sar-section-b-summary (output)
261	3	system-symbol (element)
262	3	as-of-date (element)
263	3	program-highlights (group)
264	3	changes-since-as-of-date (group)
265	3	dcp-thresholds-breached (group)
266	2	sar-section-c-technical (output)
267	3	system-symbol (element)
268	3	as-of-date (element)
269	3	operational-characteristics (group)
270	4	characteristic-description (group)
271	4	performance-parameter (element)
272	4	development-estimate (element)

contents report

273	4	approved-program-value (element)
274	4	demonstrated-performance (element)
275	4	current-estimated-perform (element)
276	4	contract-compliance (element)
277	3	technical-characteristics (group)
278	4	characteristic-description (group)
279	4	performance-parameter (element)
280	4	development-estimate (element)
281	4	approved-program-value (element)
282	4	demonstrated-performance (element)
283	4	current-estimated-perform (element)
284	4	contract-compliance (element)
285	2	sar-section-d-schedule (output)
286	3	system-symbol (element)
287	3	as-of-date (element)
288	3	production-milestone-schedule (group)
289	4	milestone-description (element)
290	4	development-estimated-date (element)
291	4	approved-program-date (element)
292	4	current-estimated-date (element)
293	3	units-accepted-to-date (group)
294	4	number-planned (element)
295	4	number-accepted (element)
296	2	sar-section-e-costs (output)
297	3	system-symbol (element)
298	3	as-of-date (element)
299	3	dollar-units (element)
300	3	program-acquistion-costs (group)
301	3	quantities-delivered (group)
302	3	unit-costs (group)
303	3	approved-design-to-cost-goal (group)
304	3	special-items (group)
305	2	sar-section-f-contract-info (output)
306	3	development-contracts (group)

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307  3      production-contracts (group)
308  4        company-name (element)
309  4        initial-contract (group)
310  5          initial-price (element)
311  5          initial-quantity (element)
312  4        current-contract-price (group)
313  5          target-price (element)
314  5          ceiling-price (element)
315  5          current-quantity (element)
316  4        price-at-completion (group)
317  5          contractor-estimate (element)
318  5          government-estimate (element)
319  3      contract-identification (group)
320  4        contract-number (element)
321  4        contract-start-date (element)
322  4        contract-type (element)
323  2    sar-section-g-variances (output)
324  3      system-symbol (element)
325  3      as-of-date (element)
326  3      characteristic-variances (group)
327  3      milestone-variances (group)
328  3      program-acquisition-cost-var (group)
329  3      contract-cost-variances (group)
330  3      budget-estimate-cost-var (group)
331  2    gantt-chart (output)
332  2    life-cycle-cost-wbs-report (output)
333  3      report-page-number (group)
334  4        current-page-number (element)
335  4        total-number-of-pages (element)
336  3      report-date (group)
337  3      work-breakdown-structure-items (group)
338  3      acquisition-cost-elements (group)
339  3      acquisition-cost-elem-numbers (group)
340  3      acquisition-cost-elem-desc (element)
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341	3	current-cost-dollar-value (element)
342	3	total (group)
343	2	lcc-initial-cost-detail (output)
344	3	report-page-number (group)
345	4	current-page-number (element)
346	4	total-number-of-pages (element)
347	3	report-date (group)
348	3	initial-cost-elements (group)
349	3	initial-cost-elem-numbers (group)
350	3	initial-cost-elem-desc (element)
351	3	current-cost-dollar-value (element)
352	3	total (group)
353	2	lcc-recurring-costs-detail (output)
354	3	report-page-number (group)
355	4	current-page-number (element)
356	4	total-number-of-pages (element)
357	3	report-date (group)
358	3	recurring-cost-elements (group)
359	3	recurring-cost-elem-numbers (group)
360	3	recurring-cost-elem-desc (element)
361	3	base-year-cost-dollar-value (element)
362	3	total (group)
363	2	lcc-recurring-costs-summary (output)
364	3	report-page-number (group)
365	4	current-page-number (element)
366	4	total-number-of-pages (element)
367	3	report-date (group)
368	3	recurring-cost-elements (group)
369	3	recurring-cost-elem-numbers (group)
370	3	recurring-cost-elem-desc (element)
371	3	base-year-cost-dollar-value (element)
372	3	escalated-cost-dollar-value (element)
373	3	total (group)
374	2	depot-maintenance-study-report (output)

375	3	end-item-depot-record (group)
376	4	mmsr-control-number (element)
377	4	end-item-fsn-nc (element)
378	4	manufacturers-identification (element)
379	4	manufactures-part-number (element)
380	4	noun-name (element)
381	4	expendability-category-code (element)
382	4	procurement-source-code (element)
383	4	unit-price (element)
384	4	source-maintenance-code (element)
385	4	record-establishment-date (element)
386	4	ama-code (element)
387	4	type-of-action-code (element)
388	3	component-item-record (group)
389	4	mmsr-control (element)
390	4	component-item-fsn-nc (element)
391	4	ci-manufactures-part-number (element)
392	4	record-identifier-code (element)
393	4	type-of-action-code (element)
394	4	ci-manufactures-identification (element)
395	4	noun-name (element)
396	4	expendability-category-code (element)
397	4	maintenance-repair-level-code (element)
398	4	procurement-source-code (element)
399	4	unit-issue (element)
400	4	unit-price (element)
401	4	field-replacement-percent (element)
402	4	breakdown-sequence-numbers (element)
403	4	indenture-code (element)
404	4	source-maintenance-code (element)
405	4	quantity-per-assembly (element)
406	4	material-req-list-repl-percent (element)
407	4	overhaul-condemnation-percent (element)
408	4	special-identification-code (element)

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409   4        revision-date (element)
410   4        ama-code (element)
411   4        transaction-identifier (element)
412   2   level-of-repair-program (output)
413   3      scheduled-lsa-interfaces (group)
414   3      scheduled-prelim-orla-review (element)
415   3      scheduled-implementation (element)
416   3      scheduled-ident-of-orla-proc (element)
417   3      sched-listing-of-orla-elements (element)
418   3      scheduled-completion-of-orla (element)
419   2   level-of-repair-status-report (output)
420   3      equipment-identification (group)
421   4        equipment (group)
422   5          equipment-name (element)
423   5          equipment-number (element)
424   5          equipment-type (element)
425   5          equipment-description (element)
426   3      milestone-schedule (group)
427   2   level-of-repair-summary-report (output)
428   3      report-page-number (group)
429   4        current-page-number (element)
430   4        total-number-of-pages (element)
431   3      report-date (group)
432   3      orla-item-numbers (group)
433   3      part-numbers (group)
434   3      orla-item-description (group)
435   3      next-higher-assembly-desc (group)
436   3      current-cost-dollar-value (element)
437   3      mean-time-between-deliveries (element)
438   3      minimum-cost-alternative (element)
439   2   opt-repair-lev-anal-report (output)
440   3      report-page-number (group)
441   4        current-page-number (element)
442   4        total-number-of-pages (element)
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443	3	total (group)
444	3	report-date (group)
445	3	orla-item-numbers (group)
446	3	orla-item-description (group)
447	3	current-cost-dollar-value (element)
448	2	orla-cost-element-output (output)
449	3	system-name (element)
450	3	element-life-cycle-cost (group)
451	4	element-name (element)
452	4	intermediate-maintenance (group)
453	5	cost (element)
454	5	percent (element)
455	4	depo-maintenance (group)
456	5	cost (element)
457	5	percent (element)
458	4	discard-maintenance (group)
459	5	cost (element)
460	5	percent (element)
461	4	split-maintenance (group)
462	5	cost (element)
463	5	percent (element)
464	2	orla-depot-mult-support (output)
465	3	report-page-number (group)
466	4	current-page-number (element)
467	4	total-number-of-pages (element)
468	3	report-date (group)
469	3	support-equipment-desc (element)
470	3	work-unit-code (group)
471	3	depot-cost-dollar-value (element)
472	3	number-of-units (element)
473	3	orla-item-numbers (group)
474	3	orla-item-description (group)
475	3	demand-time (element)
476	3	mean-time-to-test (element)

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477	3	required-time (element)
478	3	percent-of-total-time (element)
479	3	share-of-cost-dollar-value (element)
480	3	allocation-cost-dollar-value (element)
481	3	total (group)
482	2	orla-economic-anal-report (output)
483	3	report-page-number (group)
484	4	current-page-number (element)
485	4	total-number-of-pages (element)
486	3	report-date (group)
487	3	orla-item-numbers (group)
488	3	orla-item-description (group)
489	3	repair-description (group)
490	4	mean-time-between-deliveries (element)
491	4	mean-time-to-test (element)
492	4	available-time (element)
493	4	demand-time (element)
494	4	required-time (element)
495	4	mean-time-between-failures (element)
496	4	non-repairable-component-rate (element)
497	4	component-weight (element)
498	4	component-repair-cycle-time (element)
499	4	repair-rates (group)
500	4	component-average-maint-time (element)
501	3	variable-value (element)
502	3	orla-cost-elem-desc (element)
503	3	depot-cost-dollar-value (element)
504	3	intermediate-cost-dollar-value (element)
505	3	discard-cost-dollar-value (element)
506	3	total (group)
507	2	orla-end-item-resume (output)
508	3	equipment (group)
509	4	equipment-name (element)
510	4	equipment-number (element)

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511	4	equipment-type (element)
512	4	equipment-description (element)
513	3	utilization (element)
514	3	equipment-description (element)
515	3	current-maintenance-policy (element)
516	3	maintenance-analysis-results (element)
517	3	maintenance-recommendations (element)
518	3	maintenance-notes (element)
519	2	orla-input-data-printout (output)
520	3	report-page-number (group)
521	4	current-page-number (element)
522	4	total-number-of-pages (element)
523	3	report-date (group)
524	3	repair-description (group)
525	4	mean-time-between-deliveries (element)
526	4	mean-time-to-test (element)
527	4	available-time (element)
528	4	demand-time (element)
529	4	required-time (element)
530	4	mean-time-between-failures (element)
531	4	non-repairable-component-rate (element)
532	4	component-weight (element)
533	4	component-repair-cycle-time (element)
534	4	repair-rates (group)
535	4	component-average-maint-time (element)
536	3	variable-value (element)
537	2	orla-intermediate-mult-support (output)
538	3	report-page-number (group)
539	4	current-page-number (element)
540	4	total-number-of-pages (element)
541	3	report-date (group)
542	3	support-equipment-desc (element)
543	3	work-unit-code (group)
544	3	intermediate-cost-dollar-value (element)

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545	3	number-of-units (element)
546	3	orla-item-numbers (group)
547	3	orla-item-description (group)
548	3	demand-time (element)
549	3	mean-time-to-test (element)
550	3	required-time (element)
551	3	percent-of-total-time (element)
552	3	share-of-cost-dollar-value (element)
553	3	allocation-cost-dollar-value (element)
554	3	total (group)
555	2	orla-math-sensitiv-anal-report (output)
556	3	report-page-number (group)
557	4	current-page-number (element)
558	4	total-number-of-pages (element)
559	3	total (group)
560	3	report-date (group)
561	3	repair-description (group)
562	4	mean-time-between-deliveries (element)
563	4	mean-time-to-test (element)
564	4	available-time (element)
565	4	demand-time (element)
566	4	required-time (element)
567	4	mean-time-between-failures (element)
568	4	non-repairable-component-rate (element)
569	4	component-weight (element)
570	4	component-repair-cycle-time (element)
571	4	repair-rates (group)
572	4	component-average-maint-time (element)
573	3	variable-value (element)
574	3	minimum-cost-value (element)
575	3	depot-cost-dollar-value (element)
576	3	intermediate-cost-dollar-value (element)
577	3	discard-cost-dollar-value (element)

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3*          1 comprehensive-data-base (set)
1            2  db-configuration-change-dates (entity)
2              3   engineering-change-proposal (group)
3                4    change-number (element)
4                4    change-descriptive-title (element)
5                4    change-cost (element)
6                4    x-mini-board-date (element)
7                4    comments-required-date (element)
8                4    y-mini-board-date (element)
9                4    config-control-board-date (element)
10               4    procuremnt-officer-letter-date (element)
11               4    tech-agreement-letter-date (element)
12               4    contract-change-date (element)
13               4    engineering-opr (element)
14               4    configuration-control-opr (element)
15               4    procurement-opr (element)
16               4    logistics-opr (element)
17               4    change-notes (element)
18           2  db-contract-description (entity)
19             3   contract-identification (group)
20               4    contract-number (element)
21               4    contract-start-date (element)
22               4    contract-type (element)
23             3   contract-initial-price (group)
24             3   contract-type-number (group)
25               4    contract-type (element)
26               4    contract-number (element)
27             3   contractor (group)
28               4    company-name (element)
29               4    company-address (group)
30             3   at-completion-costs (group)
31               4    at-completion-budgeted (group)
32               4    latest-revised-estimate (element)
33               4    at-completion-variance (group)
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34	3	bcws-period-forecast (group)
35	3	bcws-six-months-forecast. (group)
36	3	management-reserve (group)
37	3	manpower-period-forecast (group)
38	3	maintenance-repair-cost (group)
39	3	manpower-six-months-forecast (group)
40	3	work-breakdown-structure-items (group)
41	3	wbs-description (group)
42	3	initial-target-cost (element)
43	3	negotiated-cost (element)
44	3	contract-target-price (element)
45	3	contract-target-price (element)
46	3	contract-gen-admin-rate (element)
47	3	functional-task-category (group)
48	3	target-profit (element)
49	3	contract-ceiling-price (element)
50	2	db-contract-modification-data (entity)
51	3	contract-identification (group)
52	4	contract-number (element)
53	4	contract-start-date (element)
54	4	contract-type (element)
55	3	adjusted-contract-price (group)
56	4	adjusted-target-price (element)
57	4	adjusted-ceiling-price (element)
58	3	negotiated-contract-changes (element)
59	3	adjusted-target-cost (element)
60	3	work-breakdown-structure-items (group)
61	3	wbs-description (group)
62	3	functional-task-category (group)
63	3	manpower-six-months-forecast (group)
64	3	manpower-period-forecast (group)
65	3	negotiated-cost (element)
66	3	contract-target-price (element)
67	3	contract-ceiling-price (element)

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68     3       changes-since-as-of-date (group)
69   2         db-contract-performance-data (entity)
70     3       weekly-cost-updates (group)
71       4       cost-item (element)
72       4       item-type (element)
73       4       actual-cost (element)
74       4       projected-cost (element)
75     3       weekly-technical-updates (group)
76       4       task-number (element)
77       4       revised-task-status (element)
78     3       cfsr-remarks (element)
79     3       latest-revised-estimate (element)
80     3       management-reserve (group)
81     3       weekly-schedule-updates (group)
82       4       descriptive-name (element)
83       4       task-schedule-element (element)
84       4       revised-schedule-element (element)
85   2         db-projected-system-maint-data (entity)
86     3       equipment-type (element)
87     3       repair-description (group)
88       4       mean-time-between-deliveries (element)
89       4       mean-time-to-test (element)
90       4       available-time (element)
91       4       demand-time (element)
92       4       required-time (element)
93       4       mean-time-between-failures (element)
94       4       non-repairable-component-rate (element)
95       4       component-weight (element)
96       4       component-repair-cycle-time (element)
97       4       repair-rates (group)
98       4       component-average-maint-time (element)
99   2         db-system-acquisit-plan-init (entity)
100    3       contract-funding-for-fy (element)
101    3       contract-appropriation (element)
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102	3	appropriation-identification (group)
103	3	funding-authorized-to-date (group)
104	3	contract-funding-profile (group)
105	4	unliquidated-commitments (group)
106	5	actual-to-date (element)
107	5	projected-by-period (group)
108	5	at-completion (element)
109	4	accrued-expenditures (group)
110	5	actual-to-date (element)
111	5	projected-by-period (group)
112	5	at-completion (element)
113	4	total-costs (group)
114	5	actual-to-date (element)
115	5	projected-by-period (group)
116	5	at-completion (element)
117	4	forecast-billings (group)
118	5	projected-by-period (group)
119	5	at-completion (element)
120	3	budgeted-cost-work-scheduled (group)
121	3	undistributed-budget (group)
122	3	production-vs-rdte (element)
123	3	program-name-number (group)
124	4	contract-program-name (element)
125	4	contract-number (element)
126	3	estimated-unpriced-work (element)
127	3	contract-budget-baseline (element)
128	3	bcws-six-months-forecast (group)
129	3	bcws-period-forecast (group)
130	3	prime-item-quantity (element)
131	3	est-cost-auth-unpriced-work (element)
132	3	estimated-price (element)
133	3	estimated-ceiling (element)
134	3	funds-carry-over (group)
135	3	forecasted-work (group)

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136   4      not-yet-authorized-work (group)
137   4      all-other-work (group)
138   4      forecast-subtotal (group)
139   3    approved-design-to-cost-goal (group)
140   3    weapon-system-name (element)
141   3    production-planning-schedule (element)
142   3    line-item-budget (group)
143   4      line-item-description (element)
144   4      eight-year-budget (group)
145   4      total-budget-at-completion (element)
146   3    dcp-thresholds-breached (group)
147   3    dod-component (element)
148   3    system-symbol (element)
149   3    designation (element)
150   3    nomenclature (element)
151   3    popular-name (element)
152   3    mission-and-description (element)
153   2  db-system-acquisit-plan-update (entity)
154   3    contract-funding-for-fy (element)
155   3    contract-appropriation (element)
156   3    funds-carry-over (group)
157   3    forecasted-work (group)
158   4      not-yet-authorized-work (group)
159   4      all-other-work (group)
160   4      forecast-subtotal (group)
161   3    estimated-unpriced-work (element)
162   3    contract-budget-baseline (element)
163   3    authorized-baseline-changes (group)
164   3    prime-item-quantity (element)
165   3    est-cost-auth-unpriced-work (element)
166   3    estimated-price (element)
167   3    estimated-ceiling (element)
168   3    units-accepted-to-date (group)
169   4      number-planned (element)
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170  4      number-accepted (element)
171  3      quantities-delivered (group)
172  3      approved-design-to-cost-goal (group)
173  3      development-contracts (group)
174  3      production-contracts (group)
175  4        company-name (element)
176  4        initial-contract (group)
177  5          initial-price (element)
178  5          initial-quantity (element)
179  4        current-contract-price (group)
180  5          target-price (element)
181  5          ceiling-price (element)
182  5          current-quantity (element)
183  4        price-at-completion (group)
184  5          contractor-estimate (element)
185  5          government-estimate (element)
186  3      line-item-budget (group)
187  4        line-item-description (element)
188  4        eight-year-budget (group)
189  4        total-budget-at-completion (element)
190  3      dcp-thresholds-breached (group)
191  3      program-highlights (group)
192  3      reverences-to-other-sections (group)
193  3      major-subcontractor (group)
194  4        company-name (element)
195  4        company-address (group)
196  3      changes-since-as-of-date (group)
197  2  db-task-description (entity)
198  3      task-number (element)
199  3      descriptive-name (element)
200  3      abreviation (element)
201  3      task-description-text (element)
202  3      person-in-charge (element)
203  3      earliest-start-date (element)
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204 3   latest-start-date (element)
205 3   desired-completion-date (element)
206 3   required-completion-date (element)
207 3   task-duration (element)
208 3   skill (group)
209 4   skill-type (element)
210 4   skill-level (element)
211 4   skill-hours (element)
212 3   special-people (group)
213 4   person-id (element)
214 4   person-hours (element)
215 3   special-facilities (group)
216 4   facility-id (element)
217 4   facility-hours (element)
218 3   prerequisit-tasks (group)
219 2 db-level-a-specification (entity)
220 2 db-level-b-specification (entity)
221 2 db-level-c-specification (entity)
222 2 db-test-specification (entity)

APPENDIX 70

CADSAT MIS DATA-PROCESS MATRICES

LOGICON EXTENDED CAUSAT version 3.2r1   04/01/78   1223.0   page   1
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data process report

the rows are data names, the columns are process names.

row names

1 selected-acquistion-report   output
2 comprehensive-data-base   set
3 life-cycle-cost-report   output
4 allocation-cost-dollar-value   element
5 repair-description   group
6 component-item-record   group
7 end-item-depot-record   group
8 share-of-cost-dollar-value   element
9 percent-of-total-time   element
10 opt-repair-lev-anal-report   output
11 number-of-units   element
12 minimum-cost-value   element
13 depot-cost-dollar-value   element
14 intermediate-cost-dollar-value   element
15 discard-cost-dollar-value   element
16 minimum-cost-alternative   element
17 facility-cost   group
18 inventory-cost   group
19 initial-trainning-cost   group
20 life-cycle-period   group
21 order-packing-shipping   group
22 force-basing   group
23 budgeted-cost-work-performed   group
24 weekly-cost-updates   group
25 cost-performance-report   output
26 dollar-units   element
27 contract-funds-status-report   output

column names

1 management-information-system   process
2 user-functions   process
3 reporting-capabilities   process
4 life-cycle-cost-analysis   process
5 development-cost-estimating   process
6 operations-cost-estimating   process
7 optimum-repair-level-analysis   process
8 maintenance-cost-estimating   process
9 financial-planning-tracking   process
10 generate-cpr   process
11 generate-cfsr   process
12 generate-estimated-costs   process
13 generate-cssr   process
14 schedule-planning-and-tracking   process
15 generate-cdrl-schedule   process
16 generate-network-data   process
17 generate-milestone-schedule   process
18 generate-manpower-schedule   process
19 generate-ecp-status   process
20 requirements-analysis   process
21 requirements-relation-analysis   process
22 requirements-evaluation   process
23 system-performance-analysis   process
24 system-completeness-assessment   process
25 system-consistency-analysis   process
26 traceability-analysis   process
27 configuration-accounting   process

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data process report

the rows are data names, the columns are process names.

row names

28 accrued-expend-plus-commit   group
29 total-costs   group
30 forecast-billings   group
31 current-cfsr-report-date   element
32 previous-cfsr-report-date   element
33 unliquidated-commitments   group
34 accrued-expenditures   group
35 weapon-system-budget-estimate   output
36 cost-schedule-status-report   output
37 schedule-data   set
38 cadsat-reports   output
39 logicon-cadsat-reports   output
40 system-specifications   input
41 config-change-status-report   output
42 technical-requirements-impact   output
43 special-report-data   entity
44 db-task-description   entity
45 task-description   input
46 db-system-acquisit-plan-update   entity
47 system-acquisition-plan-update   input
48 db-system-acquisit-plan-init   entity
49 system-acquisition-plan-init   input
50 db-projected-system-maint-data   entity
51 projected-system-maint-data   input
52 db-contract-performance-data   entity
53 contract-performance-data   input
54 db-contract-description   entity
55 contract-description   input
56 db-configuration-change-dates   entity

column names

28 ecp-impact-analysis   process
29 problem-tracking   process
30 generate-problem-status-report   process
31 generate-problem-impact-report   process
32 user-requested-nonstd-analyses   process
33 input-processing-capabilities   process
34 operations-support   process
35 user-modes   process
36 output-formating   process
37 standard-report-generation   process
38 plotter   process
39 gantt-chart-generation   process
40 network-chart-generator   process
41 data-access-security-control   process
42 text-processing   process
43 mis-maintenance   process

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                        data process report

the rows are data names, the columns are process names.

    row names   column names

57 configuration-change-dates   input
58 plotted-schedules   output
59 cdrl-schedule   entity
60 milestone-schedule-data   entity
61 gantt-chart   output

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data process report

data process interaction matrix

(i,j) value   meaning
----------   -------

r   row i is received or used by column j (input)
u   row i is updated by column j
d   row i is derived or generated by column j (output)
a   row i is input to, updated by, and output of
      column j (all)
f   row i is input to and output of column j (flow)
1   row i is input to and updated by column j
2   row i is updated by and output of column j

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data process interaction matrix

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                                        data process report

data process interaction matrix

      | r|r | | | | | | | i| i| i|
24 i | r|r | | | | | | | | | |
25 i | di | i | i | i | i | i | i | i| i| i|
   +-------+----+----+----+----+----+----+----+----+--+--+

data process interaction matrix

data process report

data process interaction matrix

```
                   l   l   l   l   l   l   l   i
                   i   i   i   i   i   i   r   i
                                           d   i
49  i   l   l   l   l   l   l   l   l
50  i   i   i   i   i   i   i   i   i
    +---+---+---+---+---+---+---+---+
```

data process interaction matrix

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data process report

data process interaction matrix

```
        4 4 4
        1 2 3
      +--------
   1 i| i
   2 i| i  11
   3 i| i
   4 i| i
   5 i| i
      +--------
   6 i| i
   7 i| i
   8 i| i
   9 i| i
  10 i| i
      +--------
  11 i| i
  12 i| i
  13 i| i
  14 i| i
  15 i| i
      +--------
  16 i| i
  17 i| i
  18 i| i
  19 i| i
  20 i| i
      +--------
  21 i| i
  22 i| i
  23 i| i
```

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data process report

data process interaction matrix

```
24 |  |
25 |  |
   +------+
```

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                          data process report

data process interaction matrix

*** matrix empty for rows   26 thru   50 and columns   41 thru   43

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                            data process report

data process interaction matrix

*** matrix empty for rows   51 thru   61 and columns   41 thru   43

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data process report

data process interaction matrix analysis

data
----
cadsat-reports   (output)   (row 38) not generated by any process
logicon-cadsat-reports   (output)   (row 39) not generated by any process
technical-requirements-impact   (output)   (row 42) not generated by any process
db-task-description   (entity)   (row 44) derived, but not used by any process
db-system-acquisit-plan-update   (entity)   (row 46) derived, but not used by any process
db-system-acquisit-plan-init   (entity)   (row 48) derived, but not used by any process
db-projected-system-maint-data   (entity)   (row 50) derived, but not used by any process
db-contract-performance-data   (entity)   (row 52) derived, but not used by any process
db-contract-description   (entity)   (row 54) derived, but not used by any process
db-configuration-change-dates   (entity)   (row 56) derived, but not used by any process
cdrl-schedule   (entity)   (row 59) not derived by any process
milestone-schedule-data   (entity)   (row 60) not derived by any process
gantt-chart   (output)   (row 61) not generated by any process

processes
----
management-information-system   (column 1) does not interact with any data
user-functions   (column 2) does not interact with any data
development-cost-estimating   (column 5) does not interact with any data
operations-cost-estimating   (column 6) does not interact with any data
maintenance-cost-estimating   (column 8) does not interact with any data
financial-planning-tracking   (column 9) does not interact with any data
schedule-planning-and-tracking   (column 14) does not interact with any data
generate-cdrl-schedule   (column 15) does not interact with any data
generate-milestone-schedule   (column 17) does not interact with any data
generate-manpower-schedule   (column 18) does not interact with any data
generate-ecp-status   (column 19) does not interact with any data
requirements-analysis   (column 20) does not interact with any data
requirements-evaluation   (column 22) does not interact with any data
system-performance-analysis   (column 23) does not interact with any data

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                            data process report

data process interaction matrix analysis

problem-tracking   (column 29) does not interact with any data
generate-problem-status-report   (column 30) does not interact with any data
generate-problem-impact-report   (column 31) does not interact with any data
user-requested-nonstd-analyses   (column 32) derives something, but does not use anything
operations-support   (column 34) does not interact with any data
user-modes   (column 35) does not interact with any data
output-formating   (column 36) does not interact with any data
standard-report-generation   (column 37) uses data, but does not derive or update anything
network-chart-generator   (column 40) does not interact with any data
data-access-security-control   (column 41) does not interact with any data
text-processing   (column 42) does not interact with any data

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                       data process report

process interaction matrix (incidence)   (

the rows and columns are process names from above.
an asterisk in (i,j) means that something derived
or updated by process i is used by process j.

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data process report

process interaction matrix (incidence)

```
                1 1111111112 2222222223 3333333334 444
      1234567890 1234567890 1234567890 1234567890 123
    +----------+----------+----------+----------+---
  1 |          |          |          |          |
  2 | 1        |          |          |        1 |
  3 | 1        |          |        1 |        1 |
  4 | 1        |          |          |        1 |
  5 +----------+----------+----------+----------+---
  6 | 1        |          |          |        1 |
  7 | 1        |        1 |          |          |
  8 | 1        |          |          |        1 |
  9 | 1        |          |          |        1 |
 10 | 1        |          |          |        1 |
 11 +--------1-+----------+--------1-+--------1-+-1-
 12 | 1        |        1 |          |        1 | 1
 13 | 1        |          |          |        1 | 1
 14 | 1        |          |          |        1 |
 15 +--------1-+--------1-+--------1-+--------1-+---
 16 | 1        |          |          |          |
 17 | 1        |          |          |        1 | 1
 18 | 1        |          |          |        1 | 1
 19 | 1        |          |          |        1 |
 20 +--------1-+----------+----------+--------1-+---
 21 | 1        |          |          |        1 | 1
 22 | 1        |          |          |        1 | 1
 23 | 1        |          |          |        1 | 1
```

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data process report

process interaction matrix (incidence)

```
24 i       i       i       i    i
25 i       i       i       i    i
   +-------+-------+-------+----+
```

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Air Force ESD / RADC Multics

data process report

process interaction matrix (incidence)

data process report

process interaction matrix analysis

process	index		description
management-information-system	1)	(row/col)	no interaction, but has subparts
user-functions	2)	(row/col)	no interaction, but has subparts and is part of a process
reporting-capabilities	3)	(row/col)	no successors for this process
life-cycle-cost-analysis	4)	(row/col)	no interaction, but has subparts and is part of a process
development-cost-estimating	5)	(row/col)	no interaction, but is part of another process
operations-cost-estimating	6)	(row/col)	no interaction, but is part of another process
maintenance-cost-estimating	8)	(row/col)	no interaction, but is part of another process
financial-planning-tracking	9)	(row/col)	no interaction, but has subparts and is part of a process
generate-cpr	10)	(row/col)	no successors for this process
generate-cfsr	11)	(row/col)	no successors for this process
generate-estimated-costs	12)	(row/col)	no successors for this process
generate-cssr	13)	(row/col)	no successors for this process
schedule-planning-and-tracking	14)	(row/col)	no interaction, but has subparts and is part of a process
generate-cdrl-schedule	15)	(row/col)	no interaction, but is part of another process
generate-milestone-schedule	17)	(row/col)	no interaction, but is part of another process
generate-manpower-schedule	18)	(row/col)	no interaction, but is part of another process
generate-ecp-status	19)	(row/col)	no interaction, but is part of another process
requirements-analysis	20)	(row/col)	no interaction, but has subparts and is part of a process
requirements-relation-analysis	21)	(row/col)	no interaction, but has subparts and is part of a process
requirements-evaluation	22)	(row/col)	no interaction, but has subparts and is part of a process
system-performance-analysis	23)	(row/col)	no interaction, but is part of another process
system-completeness-assessment	24)	(row/col)	no interaction, but is part of another process
system-consistency-analysis	25)	(row/col)	no interaction, but is part of another process
traceability-analysis	26)	(row/col)	no interaction, but has subparts and is part of a process
configuration-accounting	27)	(row/col)	no successors for this process
ecp-impact-analysis	28)	(row/col)	no interaction, but is part of another process
problem-tracking	29)	(row/col)	no interaction, but has subparts and is part of a process
generate-problem-status-report	30)	(row/col)	no interaction, but is part of another process
generate-problem-impact-report	31)	(row/col)	no interaction, but is part of another process
user-requested-nonstd-analyses	32)	(row/col)	no predecessors for this process
input-processing-capabilities	33)	(row/col)	no predecessors for this process
operations-support	34)	(row/col)	no interaction, but has subparts and is part of a process

```
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                              data process report

process interaction matrix analysis

user-modes                   (row/col  35) no interaction, but has subparts and is part of a process
output-formating             (row/col  36) no interaction, but has subparts and is part of a process
standard-report-generation   (row/col  37) no successors for this process
plotter                      (row/col  38) no successors for this process
gantt-chart-generation       (row/col  39) no successors for this process
network-chart-generator      (row/col  40) no interaction, but is part of another process
data-access-security-control (row/col  41) no interaction, but is part of another process
text-processing              (row/col  42) no interaction, but is part of another process
```

APPENDIX 80

CADSAT MIS NAME LIST

LOGICON EXTENDED CADSAT version 3.2r1

Air Force ESD / RADC Multics

name list

	name	type	synonym
1	abreviation	element	abrevi
2	accounting-office	interface	accoff
3	accrued-expend-plus-commit	group	acexplco
4	accrued-expenditures	group	accexp
5	acquisition-cost-elem-desc	element	
6	acquisition-cost-elem-numbers	group	accoelnu
7	acquisition-cost-elements	group	accoej
8	acquisition-cost-items	group	accoit
9	acquisition-cost-wbs-items	group	accowbit
10	acquisition-trainning-cost	group	actrco
11	actual-cost	element	actcos
12	actual-cost-work-performed	group	accowope / acwp
13	actual-to-date	element	
14	adjusted-ceiling-price	element	adcepr
15	adjusted-contract-price	group	adcopr
16	adjusted-target-cost	element	adtaco
17	adjusted-target-price	element	adtapr
18	all-other-work	group	alotwo
19	allocation-baseline-dif	element	albadi
20	allocation-cost-dollar-value	element	alcodova
21	ama-code	element	amacod
22	analyzed	keyword	
23	appropriation-identification	group	appide
24	approved-design-to-cost-goal	group	apdetocogo
25	approved-program-date	element	apprda
26	approved-program-value	element	apprva
27	as-of-date	element	asofda
28	at-completion	element	atcom
29	at-completion-budgeted	group	atcobu
30	at-completion-costs	group	atcoco
31	at-completion-variance	group	atcova

name list

	name	type	synonym
32	authorized-baseline-changes	group	aubach
33	authorized-signature	group	autsig
34	authorized-work-subtotal	group	auwosu
35	autovon-rprefix	element	autpre
36	available-time	element	avatim
37	base-year-cost-dollar-value	element	bayedova
38	batch	process	
39	bcws-period-forecast	group	bcpefo
40	bcws-six-months-forecast	group	bcsimofo
41	breakdown-sequence-numbers	element	brsenu
42	budget-at-completion	element	bac
43	budget-estimate-cost-var	group	buatco
			buescova
44	budgeted-cost-work-performed	group	bcwp
			bucowope
45	budgeted-cost-work-scheduled	group	bcws
			bucowosc
46	cadsat-reports	output	cadrep
47	category	element	catego
48	carl-schedule	entity	cdrsch
49	ceiling-price	element	ceipri
50	cfsr-remarks	element	cfem
51	change-cost	element	chacos
52	change-descriptive-title	element	chdeti
53	change-notes	element	chanot
54	change-number	element	chanum
55	changes-since-as-of-date	group	chsiasofda
56	characteristic-description	group	chades
57	characteristic-variances	group	chavar
58	ci-manufactures-identification	element	cimaid
59	ci-manufactures-part-number	element	cimapanu
60	command-processing	process	compro

name list

	name	type	synonym
61	commanders-office	interface	comoff
62	comments-required-date	element	coreda
63	commercial-area-code	element	coarco
64	committed-funds	group	comfun
65	company-address	group	comadd
66	company-name	element	comnam
			cona
67	component-average-maint-time	element	coavmati
68	component-item-fsn-nc	element	coitfsnc
69	component-item-record	group	coitre
70	component-life-cycle-period	element	colicype
71	component-projected-cost	element	coprco
72	component-repair-cycle-time	element	corecyti
73	component-weight	element	comwei
74	comprehensive-data-base	set	codaba
			cudaba
75	computed-items	entity	comite
76	config-change-status-report	output	cochstre
77	config-control-board-date	element	cocoboda
78	configuration-accounting	process	codo
			conacc
			condoc
79	configuration-change-dates	input	cochds
80	configuration-control-opr	element	cocoop
81	consistency-analysis-examples	memo	coanex
82	contract-appropriation	element	conapp
83	contract-budget-baseline	element	cobuba
84	contract-ceiling-price	element	cocepr
85	contract-change-date	element	cochda
86	contract-compliance	element	concom
87	contract-cost-variances	group	cocova
88	contract-description	input	condes

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name list

#	name	type	synonym
89	contract-funding-for-fy	element	cofufofy
90	contract-funding-profile	group	coauwo, cofupr
91	contract-funds-status-report	output	cfsr, cofustre
92	contract-gen-admin-rate	element	cogeadra
93	contract-identification	group	conide
94	contract-initial-price	group	coinpr
95	contract-modification-data	input	comoda
96	contract-number	element	connum
97	contract-performance-data	input	copeda
98	contract-program-name	element	coprna
99	contract-start-date	element	costda
100	contract-target-price	element	cotapr
101	contract-type	element	contyp
102	contract-type-number	group	cotynu
103	contract-work-authorized	group	cowoau
104	contractor	group	contr
105	contractor-estimate	element	conest
106	contractor-signature	group	
107	copany-name	element	
108	cost	element	
109	cost-dollar-values	group	codova, dolval
110	cost-item	element	cosite
111	cost-performance-report	output	copere, cpr
112	cost-schedule-status-report	output	coscstre, cssr
113	cost-variance	group	cova
114	costs-at-completion	group	coatco
115	cpr-baseline	output	cprbas

name list

name	type	synonym
116	cpr-functional-categories	output	cpfuca
117	cpr-manpower-loading	output	cpmalo
118	cpr-problem-analysis	output	cppran
119	cpr-work-breakdown-str	output	cpwobrst
120	cum-todate-actual-work-perf	group	cutoacwope
121	cum-todate-budgeted-cost	group	cutobuco
122	cumulative-bcws	group	cumbcw
123	cumulative-cost-variance	group	cucova
124	cumulative-costs-to-date	group	cucotoda
			cutoco
125	cumulative-schedule-variance	group	cuscva
126	cumulative-variance	group	cumvar
127	cumulative-work-performed	group	cuwope
128	cumulative-work-scheduled	group	cuwosc
129	current-budgeted-cost	group	cubuco
130	current-cfsr-report-date	element	cucfreda
131	current-contract-price	group	cucopr
132	current-cost-dollar-value	element	cudova
133	current-estimated-date	element	cuesda
134	current-estimated-perform	element	cuespe
135	current-maintenance-policy	element	cumapo
136	current-page-number	element	cupanu
137	current-period-actual	group	cupeac
138	current-period-costs	group	cupeco
139	current-quantity	element	curqua
140	current-variance	group	curvar
141	data-acceptance-checking	process	daacch
142	data-access-security-control	process	daacseco
143	data-conversion	process	datcon
144	data-flow-analysis	process	daflan
145	db-configuration-change-dates	entity	dbcochds
146	db-contract-description	entity	dbcondes

name list

	name	type	synonym
147	db-contract-modification-data	entity	dbcomoda
148	db-contract-performance-data	entity	dbcopeda
149	db-level-a-specification	entity	dbleasp
150	db-level-b-specification	entity	dblebsp
151	db-level-c-specification	entity	dblecsp
152	db-projected-system-maint-data	entity	dbprsymada
153	db-system-acquisit-plan-init	entity	dbsyacplin
154	db-system-acquisit-plan-update	entity	dbsyacplup
155	db-task-description	entity	dbtasdes
156	db-test-specification	entity	dbtesspe
157	dcp-thresholds-breached	group	dcthbr
158	definitized-work	group	defwor
159	demand-time	element	demtim
160	demonstrated-performance	element	demper
161	depot-cost-dollar-value	element	decodova
162	depot-maintenance	group	depmai
163	depot-maintenance-study-report	output	demastre
164	descriptive-name	element	desnam
165	design-test-trace	process	detetr
166	designation	element	design
167	desired-completion-date	element	decoda
168	development-contracts	group	devcon
169	development-cost-estimating	process	decoes
170	development-estimate	element	devest
171	development-estimated-date	element	deesda
172	discard-cost-dollar-value	element	dicodova
173	discard-maintenance	group	dismai
174	division-address	element	divadd
175	division-name	element	divnam
176	dod-component	element	
177	dollar-units	element	doluni
			dolunit

name list

	name	type	synonym
178	earliest-start-date	element	eastda
179	ecp-impact-analysis	process	eciman
180	ecp-status	entity	ecpsta
181	eight-year-budget	group	eiyebu
182	element-life-cycle-cost	group	ellicyco
183	element-name	element	elenam
184	end-item-depot-record	group	enitdere
185	end-item-fsn-nc	element	enitfsnc
186	end-of-period-actual-cum	group	enofpeaccu
187	engineering-change-proposal	group	ecp
188	engineering-opr	element	enchpr
189	equipment	group	engopr
190	equipment-description	element	equipm
191	equipment-identification	group	equdes
192	equipment-name	element	equide
193	equipment-number	element	equnam
194	equipment-type	element	equnum
195	escalated-cost-dollar-value	element	equtyp
196	est-cost-auth-unpriced-work	element	esdova
197	estimated-ceiling	element	escoauunwo
198	estimated-over-under-cost	group	estcei
199	estimated-price	element	esovunco
200	estimated-unpriced-work	element	esunwo
201	expendability-category-code	element	excaco
202	facility-cost	group	faccos
203	facility-hours	element	fachou
204	facility-id	element	facid
205	field-replacement-percent	element	firepe
206	financial-planning-tracking	process	fipltr
207	force-basing	group	forbas
208	forecast-billing-projected	group	fobipr

name list

	name	type	synonym
209	forecast-billings	group	forbil
210	forecast-subtotal	group	forsub
211	forecasted-work	group	forwor
212	functional-control-analysis	process	fucoan
213	functional-task-category	group	futaca
214	funding-authorized-to-date	group	fuautoda
215	funds-carry-over	group	fucaov
216	gantt-chart	output	gancha
			gnacha
217	gantt-chart-generation	process	gachge
			gnchge
218	general-and-administration	group	geanad
219	generate-cdrl-schedule	process	gecdsc
220	generate-cfsr	process	gecf
			gencfs
221	generate-cpr	process	gecp
			gencpr
222	generate-cssr	process	gencss
223	generate-ecp-status	process	geecst
224	generate-estimated-costs	process	geesco
225	generate-manpower-schedule	process	gemasc
226	generate-milestone-schedule	process	gemisc
227	generate-network-data	process	genech
228	generate-problem-impact-report	process	geprimre
229	generate-problem-status-report	process	geprstre
230	government-estimate	element	govest
231	hierarchial-analysis	process	hian
232	indenture-code	element	indcod
233	initial-contract	group	inicon
234	initial-cost-elem-desc	element	incoelde
235	initial-cost-elem-numbers	group	incoelnu
236	initial-cost-elements	group	incoel

name list

	name	type	synonym
237	initial-cost-items	group	incoit
238	initial-cost-wbs-items	group	incowbit
239	initial-price	element	inipri
240	initial-quantity	element	iniqua
241	initial-target-cost	element	intaco
242	initial-training-cost	group	intrco
243	input-processing-capabilities	process	dainacch
			inprca
244	input-set	set	
245	interactive	process	
246	intermediate-cost-dollar-value	element	incodova
247	intermediate-maintenance	group	intmai
248	inventory-cost	group	invcos
249	item-name	element	itenam
250	item-type	element	itetyp
251	latest-revised-estimate	element	larees
			lre
252	latest-start-date	element	lastda
253	lcc-initial-cost-detail	output	lcincode
254	lcc-recurring-costs-detail	output	lcrecode
255	lcc-recurring-costs-summary	output	lcrecosu
256	level-a-specification	input	leasp
257	level-b-specification	input	lebsp
258	level-c-specification	input	lecsp
259	level-of-repair-anal-report	output	leofreanre
			lorar
260	level-of-repair-program	output	leofrepr
			lorp
261	level-of-repair-status-report	output	leofrestre
			lorsr
262	level-of-repair-summary-report	output	leofresure
263	life-cycle-cost-analysis	process	licycoan

name list

	name	type	synonym
264	life-cycle-cost-items	group	licycoit
265	life-cycle-cost-report	output	licycore
266	life-cycle-cost-wbs-report	output	licycowbre
267	life-cycle-period	group	licype
268	line-item-budget	group	liitbu
269	line-item-description	element	liitde
270	logicon-cadsat-reports	output	locare
271	logistics-opr	element	logopr
272	lora-support-equipment	group	
273	maintenance-analysis-results	element	maanre
274	maintenance-cost-estimating	process	macoes
275	maintenance-notes	element	mainot
276	maintenance-recommendations	element	mairec
277	maintenance-repair-cost	group	mareco
278	maintenance-repair-level-code	element	mareleco
279	major-subcontractor	group	majsub
280	management-information-system	process	mainsy mis
281	management-reserve	group	manres mare
282	manpower-period-forecast	group	mapefo
283	manpower-requird-at-completion	group	mareatco
284	manpower-schedule	entity	mansch
285	manpower-six-months-forecast	group	masimofo
286	manufacturers-identification	element	manide
287	manufactures-part-number	element	mapanu
288	material-req-list-repl-percent	element	marelirepe
289	mean-time-between-deliveries	element	metibede mtbd
290	mean-time-between-failures	element	metibefa mtbf
291	mean-time-to-test	element	metitote

name list

#	name	type	synonym
			mtt.
292	milestone-description	element	mildes
293	milestone-schedule	group	milsch
294	milestone-schedule-data	entity	miscda
295	milestone-variances	group	milvar
296	minimum-cost-alternative	element	micoal
297	minimum-cost-dollar-value	element	micodova, mincost.
298	minimum-cost-value	element	micova
299	mis-maintenance	process	mismai
300	mission-and-description	element	miande
301	mmsr-control	element	mmscon
302	mmsr-control-number	element	mmconu
303	multiple-support-equipment-rpt	output	musuegrp
304	narrative-backup	output	narbac
305	negotiated-contract-changes	element	necoch
306	negotiated-cost	element	neco
307	net-funds-required	group	nefure
308	network-chart-generator	process	nechge
309	next-higher-assembly-desc	group	nehiasde, nha-desc
310	nomenclature	element	nomenc
311	non-repairable-component-rate	element	norecora
312	not-definitized-work	group	nodewo
313	not-yet-authorized-work	group	noyeauwo
314	noun-name	element	nounam
315	number-accepted	element	numacc
316	number-of-items	element	nuofit
317	number-of-units	element	nuofun
318	number-planned	element	numpla
319	office-primary-responsibility	group	ofprre, opr

name list

	name	type	synonym
320	office-prime-respon-symbol	element	ofprresy
321	operational-characteristics	group	opecha
322	operations-cost-estimating	process	opcoes
323	operations-support	process	opsu
324	opt-repair-lev-anal-report	output	opreleanre
			orjar
325	optimum-repair-level-analysis	process	oprelean
			orla
326	order-packing-shipping	group	orpash
327	order-shipping-time	group	orshti
328	orla-cost-elem-desc	element	orcoelde
329	orla-cost-element-output	output	orcoelou
330	orla-depot-mult-support	output	ordemusu
331	orla-economic-anal-report	output	orecanre
332	orla-end-item-resume	output	orenitre
333	orla-equipment	group	orlequ
334	orla-input-data-printout	output	orindapr
335	orla-intermediate-mult-support	output	orinmusu
336	orla-item-description	group	oritde
337	orla-item-numbers	group	oritnu
338	orla-items	group	orlite
339	orla-math-sensitiv-anal-report	output	ormaseanre
340	orla-variable-items	group	orvait
341	output-formating	process	oufo
			outfor
342	output-set	set	ovcope
343	overhaul-condemnation-percent	element	pashco
344	packing-shipping-cost	group	panu
345	part-numbers	group	part-nos
346	part-numbers-items	group	panuit
347	percent	element	

name list

	name	type	synonym
348	percent-of-total-time	element	peoftoti
349	performance-parameter	element	perpar
350	period-of-completion	element	peofco
351	person-hours	element	perhou
352	person-id	element	perid
353	person-in-charge	element	peinch
354	phone-number	element	phonum
355	plotted-schedules	output	plosch
356	plotter	process	
357	popular-name	element	popnam
358	preparation-agency	element	preage
359	prerequisit-tasks	group	
360	previous-cfsr-report-date	element	prcfreda
361	price-at-completion	group	pratco
362	prime-budget-beginning-of-perd	group	prbubeofpe
363	prime-contractor	group	pricon
364	prime-item-quantity	element	pritqu
365	problem-name	element	pronam
366	problem-tracking	process	protra
367	problem-tracking-examples	memo	prtrex
368	problems	group	
369	procurement-opr	element	proopr
370	procurement-source-code	element	prsoco
371	procuremnt-officer-letter-date	element	profleda
372	product-test-trace	process	prtetr
373	production-contracts	group	procon
374	production-milestone-schedule	group	prmisc
375	production-planning-schedule	element	prplsc
376	production-vs-rdte	element	prvsrd
377	program-acquisition-cost-var	group	praccova
378	program-acquistion-costs	group	pracco
379	program-baseline-beg-of-period	group	prbabeofpe

name list

	name	type	synonym
380	program-budget-report	output	prbure
381	program-description	element	prodes
382	program-element-number	element	prelnu
383	program-highlights	group	prohig
384	program-manager	element	proman
385	program-name-number	group	prnanu
386	program-office	interface	prof
			spo
			system-program-offi
387	program-office-name	element	profna
388	program-period-end-baseline	group	prpeenba
389	program-schedule	output	prosch
390	program-title	element	protit
391	projected-by-period	group	prbype
392	projected-cost	element	procos
393	projected-system-maint-data	input	prsymada
394	quantities-delivered	group	quadel
395	quantity-per-assembly	element	qupeas
396	record-establishment-date	element	reesda
397	record-identifier-code	element	reidco
398	recurring-cost-elem-desc	element	recoelde
399	recurring-cost-elem-numbers	group	recoelnu
400	recurring-cost-elements	group	recoel
401	recurring-cost-items	group	recoit
402	recurring-cost-wbs-items	group	recowbit
403	recurring-trainning-cost	group	retrco
404	repair-description	group	repdes
			varnam
405	repair-rates	group	reprat
406	repair-variable-name	element	revana
407	report-control-symbol	element	recosy
408	report-date	group	repdat

name list

#	name	type	synonym
409	report-page-number	group	repanu
410	report-period	element	repe
411	reporting-capabilities	process	reca
412	required-completion-date	element	repcap
413	required-time	element	recoda
414	requirements-analysis	process	reqtim
415	requirements-design-trace	process	rean
416	requirements-evaluation	process	reqana
417	requirements-product-trace	process	redetr
418	requirements-relation-analysis	process	reqeva
419	requirements-test-trace	process	reprtr
420	results-of-analysis	element	rcrean
421	reverences-to-other-sections	group	retetr
422	revised-schedule-element	element	reofan
423	revised-task-status	element	retootse
424	revision-date	element	rescel
425	sar-section-a-cover-sheet	output	retast
426	sar-section-b-summary	output	revdat
427	sar-section-c-technical	output	saseacosh
428	sar-section-d-schedule	output	saseacovsh
429	sar-section-e-costs	output	sasebsu
430	sar-section-f-contract-info	output	sasecte
431	sar-section-g-variances	output	sasedsc
432	sched-listing-of-orla-elements	element	saseeco
433	schedule	group	sasefcoin
434	schedule-data	set	sasegva
435	schedule-planning-and-tracking	process	sclioforej
436	schedule-variance	group	schedu
437	scheduled-completion-of-orla	element	schdat
			scplantr
			scva
			sccoofor

name list

	name	type	synonym
438	scheduled-ident-of-orla-proc	element	scidoforpr
439	scheduled-implementation	element	schimp
440	scheduled-lsa-interfaces	group	sclsin
441	scheduled-prelim-orla-review	element	scprorre
442	selected-acquistion-report	output	seacre
443	share-of-cost-dollar-value	element	shofcodova
444	share-ratio	element	
445	shipping-cost	group	shicos
446	signature	element	
447	signature-date	element	
448	skill	group	
449	skill-hours	element	skihou
450	skill-level	element	skilev
451	skill-type	element	skityp
452	source-maintenance-code	element	somaco
453	special-facilities	group	spefac
454	special-identification-code	element	spidco
455	special-items	group	speite
456	special-people	group	
457	special-report-data	entity	spreda
458	split-maintenance	group	splmai
459	standard-report-generation	process	strege
460	statement-of-problem	element	stapro
461	subsystem-name	element	subnam
462	subtotal	group	
463	support-equipment-desc	element	
464	system-acquisition-plan-init	input	sueqde
465	system-acquisition-plan-update	input	syacplin
466	system-completeness-assessment	process	syacplup
467	system-completeness-example	memo	sycoas
468	system-consistency-analysis	process	sycoex
469	system-contractors	interface	sycoan
			syscon

name list

	name	type	synonym
470	system-major-contractors	interface	symaco
471	system-minor-contractors	interface	symico
472	system-name	element	sysnam
473	system-performance-analysis	process	sypean
474	system-performance-memo	memo	sypeme
475	system-prime-contractor	interface	syprco
476	system-specifications	input	sysspe
477	system-symbol	element	syssym
478	target-price	element	tarpri
479	target-profit	element	tapr
480	task-description	input	tasdes
481	task-description-text	element	tadete
482	task-duration	element	tasdur
483	task-number	element	tasnum
484	task-schedule-element	element	tascel
485	tech-agreement-letter-date	element	teagleda
486	technical-characteristics	group	teccha
487	technical-requirements-impact	output	tereim
488	test-specification	input	tesspe
489	text-processing	process	tepr
490	title	element	
491	total	group	
492	total-allocated-budget	element	toalbu
493	total-budget	group	totbud
494	total-budget-at-completion	element	tobuatco
495	total-costs	group	totcos
496	total-funds-requirements	group	tofure
497	total-life-cycle-cost-summary	output	tolicycosu
498	total-manpower	group	totman
499	total-number-of-pages	element	tonuofpa
500	total-variance	group	totvar
501	traceability-analysis	process	traana

name list

	name	type	synonym
502	trainning-cost	group	tran
503	transaction-identifier	element	tracos
504	type-of-action-code	element	traide
505	type-of-schedule	element	tyofacco
506	undistributed-budget	group	tyofsc
			unbu
			undbud
507	unit-costs	group	unicos
508	unit-issue	element	uniiss
509	unit-price	element	unipri
510	units-accepted-to-date	group	unactoda
511	unliquidated-commitments	group	unlcom
512	user-functions	process	usefun
			usfu
513	user-modes	process	usemod
			usmo
514	user-requested-nonstd-analyses	process	dabaqu
			usrenoan
515	utilization	element	utiliz
516	variable-value	element	varval
517	variance-adjustment	group	varadj
518	wbs-description	group	wbsdes
519	wbs-descriptor	group	
520	wbs-item	element	wbsite
521	wbs-item-costs	group	wbitco
522	weapon-system-budget-estimate	output	wesybues
523	weapon-system-name	element	wesyna
524	weekly-cost-updates	group	wecoup
525	weekly-schedule-updates	group	wescup
526	weekly-technical-updates	group	weteup
527	work-breakdown-structure-items	group	wobrstit
528	work-to-be-performed	element	wotobepe

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name list

name	type	synonym
529	work-unit-code	group	wounco
			wuc
530	x-mini-board-date	element	xmida
531	y-mini-board-date	element	ymida

APPENDIX 9Ø

SELECTED BIBLIOGRAPHY

(CADSAT GENERATED)

  1 entity   GFE;
  2   synonyms are: gfe-docs;
  3   keywords: documents,
  4   gfe;
  5

  6 group   GFE-documents;
  7   synonyms are: gfe-documents;
  8   description;
  9   This is a CADSAT listing of all Government Furnished
 1Ø   Equipment (GFE) for the CADSAT/MIS contract, in this
 11   circumstance a list of GFE documents;
 12   keywords: documents,
 13   gfe;
 14   consists of:
 15   AD7Ø13Ø3,
 16   AD784926,
 17   ADAØ1173Ø,
 18   AD7652Ø3,
 2Ø   ADAØ16452,
 21   AD7673Ø6,
 22   AD73621Ø,
 23   AD736987,
 24   AD877476L,
 25   AD766Ø92,
 26   AD785143,
 27   AD783544,
 28   AD7877Ø4,
 29   ADAØØ6334,
 3Ø   AD781749,
 31   ADBØØ53Ø6L,
 32   ADBØØ8Ø75,
 33   ADBØ1Ø246L;
 34

 35 element   AD7Ø13Ø3;
 36   synonyms are: ad7Ø13Ø3;
 37   description;
 38   Application and Demonstration of NAS Saufley Manpower
 39   Allocation and Productivity Measurement Model;
 4Ø   keywords: documents,
 41   gfe;
 42   contained in: GFE-documents;

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43

44 element                                   AD784926;
45     synonyms are:  ad784926;

46     description;
47            Representation of Information in the Design-Construct:
48      Process;
49     keywords:       documents,
50                     gfe;
51     contained in:  GFE-documents;
52


53 element                                   ADA011730;
54     synonyms are:  ada011730;
55     description;
56            Experimental Interim RADC MIS System (FEMIS);
57     keywords:       documents,
58                     gfe;
59     contained in:  GFE-documents;
60


61 element                                   AD765203;
62     synonyms are:  ad765203;
63     description;
64            Generalized Data Base Management System and Selected
65      Air Force Applications;
66     keywords:       documents,
67                     gfe;
68     contained in:  GFE-documents;
69


70 element                                   AD875036;
71     synonyms are:  ad875036;
72     description;
73            Description of the SACCS Data Management System;
74     keywords:       documents,
75                     gfe;
76     contained in:  GFE-documents;
77     security is:    TOIT,
78                     C.Hartman;
79


80 element                                   ADA016452;
81     synonyms are:  ada016452;
82     description;
83            Concept of a Management Information System for TESPO;
84     keywords:       documents,
85                     gfe;
86     contained in:  GFE-documents;
```

```
87

88 element                                     AD767386;
89     synonyms are:  ad767386;
90     description;

91           Program and Financial Management Plan, Resources Informatic
92      Systems. Volume IV. NUSC PERT/TIME/COST Program User's Manual;
93     keywords:        documents,
94                      gfe;
95     contained in:  GFE-documents;
96

97 element                                     AD736210;
98     synonyms are:  ad736210;
99     description;
100          Use of Edit Information to Measure and Reduce File Error
101     Content in a MIS;
102    keywords:        documents,
103                     gfe;
104    contained in:  GFE-documents;
105

106 element                                    AD736987;
107    synonyms are:  ad736987;
108    description;
109          MIS Technology: A view of the Future;
110    keywords:        documents,
111                     gfe;
112    contained in:  GFE-documents;
113

114 element                                    AD877476L;
115    synonyms are:  AD8774761,
116                   ad877476L,
117                   ad8774761;
118    description;
119          The Army Communications-Electronics Management Information
120     System (ACEMIS) -Coordination Draft- Master Development Plan
121     Volume I.  Executive Summary
122           -- Two copies of this manual were acquired
123                 rather than a copy of manual AD877476
124          Application and Demonstration of NAS Saufley Manpower
125     Allocation and Productivity Measurement Model;
126    keywords:        documents,
127                     gfe;
128    contained in:  GFE-documents;
129    security is:    TOIT,
130                    C.Hartman;
131
```

```
132 element                              AD766092;
133     synonyms are:  ad766092;
134     description;
135         Implementation of Complex Management Information Systems;

136     keywords:      documents,
137                    gfe;
138     contained in: GFE-documents;
139


140 element                              AD785143;
141     synonyms are:  ad785143;
142     description;
143         Feasibility and Utility of an on-line Information
144      Communications System in a Research and Development Management
145      and Planning Environment;
146     keywords:      documents,
147                    gfe;
148     contained in: GFE-documents;
149


150 element                              AD783544;
151     synonyms are:  ad783544;
152     description;
153         Application of a Process Model to a Management Support System
154     keywords:      documents,
155                    gfe;
156     contained in: GFE-documents;
157


158 element                              AD787704;
159     synonyms are:  ad787704;
160     description;
161         An Analysis of Program Evaluation and Review Technique (PERT)
162      in Weapon System Acquisition;
163     keywords:      documents,
164                    gfe;
165     contained in: GFE-documents;
166


167 element                              ADA006334;
168     synonyms are:  ada006334;
169     description;
170         An Evaluation of the Integrated Managerial Programing Analys:
171      and Control Technique System (IMPACT) of the Aeronautical Systems
172      Division (AFSC) -- A Management Information System;
173     keywords:      documents,
174                    gfe;
175     contained in: GFE-documents;
176         ';
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177 element                                    AD781749;
178     synonyms are:  ad781749;
179     description;
180           Technical Literature Review Concerning Management Informati
181      Systems;
182     keywords:      documents,
183                    gfe;
184     contained in:  GFE-documents;
185
186 element                                    ADB005306L;
187     synonyms are:  ADB0053061,
188                    adb005306L,
189                    adb0053061;
190     description;
191           Implementation of United States Air Force Automatic
192      Data Processing Requirements Studies - A Management
193       Dilemma;
194     keywords:      documents,
195                    gfe;
196     contained in:  GFE-documents;
197     security is:   TOIT,
198                    C.Hartman;
199
200 element                                    ADB008075;
201     synonyms are:  adb008075;
202     description;
203           DREV Management Information System;
204     keywords:      documents,
205                    gfe;
206     contained in:  GFE-documents;
207
208 element                                    ADB010246L;
209     synonyms are:  ADB0102461,
210                    adb010246L,
211                    adb0102461;
212     description;
213           Army Management Information Systems Master Plan -
214      (AMIS Master Plan);
215     keywords:      documents,
216                    gfe;
217     contained in:  GFE-documents;
218     security is:   TOIT,
219                    C.Hartman;
```